DOE/RL-91-27
Revision 2
REISSUE

Hanford Facility Permit Application, 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal Unit

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Office of River Protection

P.O. Box 450
Richland, Washington 99352

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L. E. Borneman
CH2M HILL Hanford Group, Inc.

Date Published
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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

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P.O. Box 450
Richland, Washington 99352

L. D. Aardal   09/20/2006
Release Approval   Date

ORIGINAL

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part I: Background Information

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Function	Organization	Date	Signature/Date
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Responsible Manager	Env. Programs	8/30/06	[illegible] 8/30/06
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CH2M HILL Office of Chief Counsel	⦿	○	Mll Hal 8-30-2006
DOE-ORP Public Affairs/Communications	○	⦿	
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Other:	○	○	

Comments:

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Trademark/Copyright "Right to Use" Information or Permission Documentation	○	○	
CH2M HILL Administrative Checklist	○	○	
CH2M HILL Technical Checklist	○	○	
	○	○	

FOREWORD

HANFORD FACILITY PERMIT APPLICATION, 222-S DANGEROUS AND MIXED WASTE TREATMENT, STORAGE, AND DISPOSAL UNIT

FOREWORD

The *Hanford Facility Dangerous Waste Permit Application* is considered to be a single application organized into a General Information Portion (document number DOE/RL-91-28) and a Unit-Specific Portion. The scope of the Unit-Specific Portion is limited to Part B permit application documentation submitted for individual, 'operating' treatment, storage, and/or disposal units, such as the 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal (TSD) unit (this document, DOE/RL-91-27).

Both the General Information and Unit-Specific Portions of the *Hanford Facility Dangerous Waste Permit Application* address the content of the Part B permit application guidance prepared by the Washington State Department of Ecology (Ecology 1996) and the U.S. Environmental Protection Agency (40 Code of Federal Regulations Part 270) with additional information needs defined by the *Hazardous and Solid Waste Amendments* and revisions of *Washington Administrative Code* 173-303, "Dangerous Waste Regulations." For ease of reference, the Washington State Department of Ecology alphanumeric section identifiers from the permit application guidance documentation (Ecology 1996) follow, in brackets, the chapter headings and subheadings.

Documentation contained in the General Information Portion is broader in nature and could be used by multiple treatment, storage, and/or disposal units (e.g., the glossary provided in the General Information Portion). Wherever appropriate, the 222-S TSD unit permit application documentation makes cross-reference to the General Information Portion, rather than duplicating text.

Information provided in this 222-S TSD unit permit application documentation is current as of September 2006.

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Contents

DOCUMENT CONTENTS

APPENDIXES

DOCUMENT CONTENTS (cont)

METRIC CONVERSION CHART

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			Length		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			Area		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			Mass (weight)		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			Volume		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Force/Pressure			Force/Pressure		
pounds per square inch	6.895	kilopascals	kilopascals	0.14504	pounds per square inch

Source: Engineering Unit Conversions, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

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Chapter 1.0

CONTENTS

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1.0 PART A [A]

The following is a chronology of the regulatory history of the 222-S Laboratory Complex.

- On November 28, 1987, the original Hanford Facility Dangerous Waste Part A (Part A) Permit Application, Form 3, Revision 0, was submitted to the Washington State Department of Ecology (Ecology).

- On December 20, 1991, the Part A, Form 3, Revision 1, added a description of two waste management units identified as the 219-S Waste Handling Facility and the 222-S Dangerous and Mixed Waste Storage Area. Also, this revision added process design capacity for tank storage in the 219-S Waste Handling Facility and decreased the process design capacity for container storage in the 222-S Dangerous and Mixed Waste Storage Area.

- On April 13, 1993, the Part A, Form 3, Revision 2, added dangerous waste numbers F001 and F002 and state-only dangerous waste numbers WP02 and W001 to correspond with dangerous waste numbers from the Double-Shell Tank (DST) System and for labpack requirements.

- On November 11, 1994, the Part A, Form 3, Revision 3 added dangerous waste number F039 (multi-source leachate) as waste derived from nonspecific source waste F001 through F005 to correspond with dangerous waste numbers from the DST System.

- On September 30, 1996, the Part A, Form 3, Revision 4, was submitted to support transition of this treatment, storage, and/or disposal (TSD) unit to the Project Hanford Management Contract with Fluor Daniel Hanford, Inc. as the new "co-operator." This revision increased the tank storage capacity of the 219-S Waste Handling Facility with the addition of tank 104 and increased the container storage capacity for the 222-S Dangerous and Mixed Waste Storage Area to allow the stacking of containers. Also added were all dangerous waste numbers "P" and "U" to allow flexibility for receipt of dangerous waste from various Hanford Facility TSD units.

- On March 4, 1997, the Part A, Form 3, Revision 5, incorporated language that the 222-S Laboratory Complex receives and manages various waste types from onsite and offsite units before transfer to the DST System. Included was the addition of a portion of Room 2-B as a liquid mixed waste container storage area and the increase of the container process design capacity by 2,500 liters.

- On December 19, 1997, the Part A, Form 3, Revision 6, deleted language stating that the 222-S Laboratory Complex waste management units receive and manage various waste types from onsite generating and/or TSD units and offsite generators. Included was additional language for the periodical use of mixed waste tank 103 for primary and backup storage and/or treatment before transfer of waste to the DST System.

- On December 23, 1998, the Part A, Form 3, Revision 7, increased the container storage process design capacity from 6,200 liters to 27,020 liters because of installation of the new storage structures. The new storage structures are located near the location of the old structures. Included were 69 dangerous waste numbers that could be managed at the 222-S Dangerous and Mixed Waste Storage Area and Room 2-B. Three dangerous waste numbers were deleted as these were removed from the regulations.

- On August 30, 2000, the Part A, Form 3, Revision 8, increased the container storage process design capacity from 27,020 liters to 28,470 liters because Room 4-E was added as a container storage area. Language for tank 103 isolation was deleted because activities were completed. The number of figures was reduced to three and the figures were updated. A figure of Room 4-E was added. The process description was revised to include only the identification of the tank storage/treatment tanks and container storage locations and related process design capacities. Agreements were made during the 222-S Laboratory Complex Notice of Deficiencies Workshops that the tank waste would be transferred to the "DST System, or onsite TSD units, or offsite TSD facility." Also, agreements included a statement be added that a "portion of Room 2-B provides container storage of solid and/or liquid mixed waste." The added information can be found in 222-S Laboratory Complex Part B Permit Application, Revision 1, Chapter 4.0, "Process Information."

- On October 10, 2000, the Part A, Form 3, Revision 8A, included updating the 222-S Laboratory Complex Container Storage and Tank System Treatment and Storage Area site maps to include a statement "(Refer to Topographic Map Laboratory Complex H-13-000006)." Added an updated photograph of the 219-S Waste Handling Facility and a new photograph of Room 4-E (east side). The updates and additions were incorporated in accordance with letter, L. Rudd, Ecology, to S. Wisness, RL, "Documentation Supporting Modification F of the Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit," dated September 22, 2000. The letter also stated that the information is provided for "clarification purposes that will not require recertification."

- On March 9, 2001, the Part A, Form 3, Revision 9, was revised to include illustrations that were modified to show the "loading/unloading areas" in accordance with letter, L. Rudd, Ecology, to S. Wisness, RL, "Completeness Review for Modification F of the Hanford Facility Resources Conservation and Recovery Act (RCRA) Permit," dated January 25, 2001. Also, in "S01/T04 Storage Container/Treatment-Other," 29 dangerous waste numbers [U230 through U233 and U242 (incorporated into F027), U277, U365, U366, U375 through U379, U381 through U386, U390 through U393, U396, U400 through U403, and U407] were deleted. These dangerous waste numbers were eliminated in accordance with *Federal Register* 50 FR 51125, 62 FR 32977, and *Washington Administrative Code* (WAC) 173-303, "Dangerous Waste Regulations."

- On August 28, 2003, the Part A Form 3, Rev 10, was revised to reflect a change in co-operator from Fluor Hanford, Inc. to CH2M HILL Hanford Group, Inc. in accordance with letter from R. J. Schepens, Office of River Protection, to M. A. Wilson, Ecology, "Permitting Documentation Associated with the Transfer of the 222-S Laboratory Complex."

- On September 2, 2006, the Part A Form, Rev 11, was revised to reflect adding new waste codes WPCB (which replaces the state-only code for polychlorinated biphenyls, W001) and WL02, which addresses state-only labpacks. These codes were added to reflect the change in dangerous waste regulations as of January 2005. The Treatment, Storage, and Disposal (TSD) unit name was changed from "222-S Laboratory Complex" to the "222-S TSD unit." Other changes include new photographs and diagrams depicting the 222-S TSD unit and an updated process design capacity for treatment in tanks.

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WASHINGTON STATE DEPARTMENT OF ECOLOGY

Dangerous Waste Permit Application Part A Form

Date Received	Reviewed by:	Date: 0 7 2 5 2 0 0 5
Month Day Year	Approved by:	Date: 0 8 1 0 2 0 0 5

Please refer to instructions for completing this form.

I. This form is submitted to: (place an "X" in the appropriate box)

- ☒ Request modification to a final status permit (commonly called a "Part B" permit)
- ☐ Request a change under interim status
- ☐ Apply for a final status permit. This includes the application for the initial final status permit for a site or for a permit renewal (i.e., a new permit to replace an expiring permit).
- ☐ Establish interim status because of the wastes newly regulated on: (Date)

List waste codes:

II. EPA/State ID Number

W A 7 8 9 0 0 0 8 9 6 7

III. Name of Facility

U.S. Department of Energy – Hanford Site

IV. Facility Location (Physical address not P.O. Box or Route Number)

A. Street

825 Jadwin

City or Town	State	ZIP Code
Richland	WA	99354

County Code (if known)	County Name
0 0 5	Benton

B. Land Type	C. Geographic Location Latitude (degrees, mins, secs)	Longitude (degrees, mins, secs)	D. Facility Existence Date Month	Day	Year
F	S E E T O P O	M A P	0 3	2 2	1 9 4 3

V. Facility Mailing Address

Street or P.O. Box

P.O. Box 550

City or Town	State	ZIP Code
Richland	WA	99352

VI. Facility contact (Person to be contacted regarding waste activities at facility)		
Name (last)	**(first)**	
Schepens	Roy	
Job Title	**Phone Number (area code and number)**	
Manager	(509) 376-6677*	
Contact Address		
Street or P.O. Box		
P.O. Box 450		
City or Town	**State**	**ZIP Code**
Richland	WA	99352

VII. Facility Operator Information		
A. Name	**Phone Number (area code and number)**	
Department of Energy* Owner/Operator CH2M HILL Hanford Group, Inc.** Co-Operator for the 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal unit	(509) 376-6677* (509) 373-1677**	
Street or P.O. Box		
P.O. Box 450 * P.O. Box 1500 **		
City or Town	**State**	**ZIP Code**
Richland	WA	99352
B. Operator Type	F	
C. Does the name in VII.A reflect a proposed change in operator?	☐ Yes ☒ No	
If yes, provide the scheduled date for the change:	Month / Day / Year	
D. Is the name listed in VII.A. also the owner? If yes, skip to Section VIII.C.	☐ Yes ☒ No	

VIII. Facility Owner Information		
A. Name	**Phone Number (area code and number)**	
Roy J. Schepens, Operator/Facility-Property Owner	(509) 376-6677	
Street or P.O. Box		
P.O. Box 550		
City or Town	**State**	**ZIP Code**
Richland	WA	99352
B. Operator Type	F	
C. Does the name in VII.A reflect a proposed change in operator?	☐ Yes ☒ No	
If yes, provide the scheduled date for the change:	Month / Day / Year	

IX. NAICS Codes (5/6 digit codes)														
A. First							**B. Second**							
5	6	2	2	1		Waste Treatment and Disposal	9	2	4	1	1	0	Administration of Air and Water Resource and Solid Waste Management Programs	
C. Third							**D. Fourth**							

5	4	1	7	1	0	Research & Development in the Physical, Engineering, & Life Sciences	9	9	9	9	9	9	Unclassified Establishments

X. Other Environmental Permits (see instructions)

A. Permit Type			B. Permit Number												C. Description
	E		A	I	R	-	0	2	-	1	2	1	1		WAC 246-247, Radiation Protection – Air Emissions
	E		A	I	R	-	0	6	-	6	0	9			WAC 246-247, Radiation Protection – Air Emissions
	E						0	6	-	0	2	5	3		Special Use: Egress Modification-Fire Code

XI. Nature of Business (provide a brief description that includes both dangerous waste and non-dangerous waste areas and activities)

The 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal (TSD) unit includes four TSD components: 219-S Waste Handling Facility, 222-S Dangerous and Mixed Waste Storage Area (DMWSA), Room 4-E container storage area (Room 4-E), and the northern portion of Room 2-B container storage area (Room 2-B).

The 219-S Waste Handling Facility includes the 219-S Tank System (tanks 101, 102, 103, and 104 and ancillary equipment), operating gallery, and sample gallery, and is located northeast of the 222-S Laboratory building. The DMWSA is located north of the 222-S Laboratory building. Rooms 2-B and 4-E are located within (north side) the 222-S Laboratory building, which is located in the 200 West Area of the Hanford Facility. The 222-S Laboratory began laboratory and waste management operations in June 1951.

S01 Storage in Containers

The maximum process design capacity for container storage is 28,470 liters. Containers containing dangerous and/or mixed waste are stored in the DMWSA, Room 4-E, and the northern portion of Room 2-B.

S02 Storage in Tanks

The 219-S Waste Handling Facility houses the 219-S Tank System, which comprises four tanks, three active and one inactive (tanks 101, 102, 104, and 103 respectively). Tank 103 is located within the 219-S Tank System but was drained isolated and triple rinsed and is no longer used for waste management.

The maximum process design capacity for tank storage is 37,472 liters. Tanks 101, 102, and 104 are used for dangerous and mixed waste storage.

T01 Treatment in Tanks

The maximum process design capacity for treatment in tanks is 37,472 liters. Tanks 101, 102, and 104 are used for dangerous and mixed waste treatment.

Note: Although tank 201 (figure, page 26, 219-S Waste Handling Facility) is indicated as being within the TSD unit boundary, its sole function is to provide caustic solution for waste treatment within tanks 101, 102, and 104. Mixed and/or dangerous waste is not treated, stored, or disposed of within tank 201, and therefore this tank is not considered to be a permitted TSD component.

WL02 was added to this Part A Form to address lab packs containing state-only waste. WPCB was added to replace W001, based on the January 2005 change to *Washington Administrative Code* (WAC) 173-303, "Dangerous Waste Regulations."

EXAMPLE FOR COMPLETING ITEMS XII and XIII (shown in lines numbered X-1, X-2, and X-3 below): A facility has two storage tanks that hold 1200 gallons and 400 gallons respectively. There is also treatment in tanks at 20 gallons/hr. Finally, a one-quarter acre area that is two meters deep will undergo *in situ vitrification.*

Section XII. Process Codes and Design Capacities								Section XIII. Other Process Codes								
Line Number		A. Process Codes (enter code)			B. Process Design Capacity		C. Process Total Number of Units	Line Number		A. Process Codes (enter code)			B Process Design Capacity		C. Process Total Number of Units	D. Process Description
					1. Amount	2. Unit of Measure (enter code)							1. Amount	2. Unit of Measure (enter code)		
X	1	S	0	2	1,600	G	002	X	1	T	0	4	700	C	001	In situ vitrification
X	2	T	0	3	20	E	001									
X	3	T	0	4	700	C	001									
	1	S	0	2	37,472	L	003									
	2	T	0	1	37,472	L	003		2							
	3	S	0	1	28,470	L	003		3							
	4								4							
	5								5							
	6								6							
	7								7							
	8								8							
	9								9							
1	0							1	0							
1	1							1	1							
1	2							1	2							
1	3							1	3							
1	4							1	4							
1	5							1	5							
1	6							1	6							
1	7							1	7							
1	8							1	8							
1	9							1	9							
2	0							2	0							
2	1							2	1							
2	2							2	2							
2	3							2	3							
2	4							2	4							
2	5							2	5							

XIV. Description of Dangerous Wastes

Example for completing this section: A facility will receive three non-listed wastes, then store and treat them on-site. Two wastes are corrosive only, with the facility receiving and storing the wastes in containers. There will be about 200 pounds per year of each of these two wastes, which will be neutralized in a tank. The other waste is corrosive and ignitable and will be neutralized then blended into hazardous waste fuel. There will be about 100 pounds per year of that waste, which will be received in bulk and put into tanks.

Line Number			A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Processes									
									(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
X	1		D	0	0	2	400	P	S	0	1	T	0	1				
X	2		D	0	0	1	100	P	S	0	2	T	0	1				
X	3		D	0	0	2												Included with above
		1	D	0	0	1	283,955	K	S	0	2	T	0	1				
		2	D	0	0	2		K	S	0	2	T	0	1				
		3	D	0	0	3		K	S	0	2	T	0	1				
		4	D	0	0	4		K	S	0	2	T	0	1				
		5	D	0	0	5		K	S	0	2	T	0	1				
		6	D	0	0	6		K	S	0	2	T	0	1				
		7	D	0	0	7		K	S	0	2	T	0	1				
		8	D	0	0	8		K	S	0	2	T	0	1				
		9	D	0	0	9		K	S	0	2	T	0	1				
	1	0	D	0	1	0		K	S	0	2	T	0	1				
	1	1	D	0	1	1		K	S	0	2	T	0	1				
	1	2	D	0	1	8		K	S	0	2	T	0	1				
	1	3	D	0	1	9		K	S	0	2	T	0	1				
	1	4	D	0	2	2		K	S	0	2	T	0	1				
	1	5	D	0	2	8		K	S	0	2	T	0	1				
	1	6	D	0	2	9		K	S	0	2	T	0	1				
	1	7	D	0	3	0		K	S	0	2	T	0	1				
	1	8	D	0	3	3		K	S	0	2	T	0	1				
	1	9	D	0	3	4		K	S	0	2	T	0	1				
	2	0	D	0	3	5		K	S	0	2	T	0	1				
	2	1	D	0	3	6		K	S	0	2	T	0	1				
	2	2	D	0	3	8		K	S	0	2	T	0	1				
	2	3	D	0	3	9		K	S	0	2	T	0	1				
	2	4	D	0	4	0		K	S	0	2	T	0	1				
	2	5	D	0	4	1		K	S	0	2	T	0	1				

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
26	D043		K	S02 T01	
27	WP01		K	S02 T01	
28	WP02		K	S02 T01	
29	WT01		K	S02 T01	
30	WT02		K	S02 T01	
31	F001		K	S02 T01	
32	F002		K	S02 T01	
33	F003		K	S02 T01	
34	F004		K	S02 T01	
35	F005		K	S02 T01	
36	F039		K	S02 T01	
37	D001	48,840	K	S01	
38	D002		K	S01	
39	D003		K	S01	
40	D004		K	S01	
41	D005		K	S01	
42	D006		K	S01	
43	D007		K	S01	
44	D008		K	S01	
45	D009		K	S01	
46	D010		K	S01	
47	D011		K	S01	
48	D012		K	S01	
49	D013		K	S01	
50	D014		K	S01	
51	D015		K	S01	
52	D016		K	S01	
53	D017		K	S01	
54	D018		K	S01	
55	D019		K	S01	
56	D020		K	S01	
57	D021		K	S01	
58	D022		K	S01	
59	D023		K	S01	
60	D024		K	S01	
61	D025		K	S01	
62	D026		K	S01	
63	D027		K	S01	
64	D028		K	S01	
65	D029		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number			A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)									D. Process (2) Process Description [If a code is not entered in D (1)]
	6	6	D	0	3	0		K	S	0	1							
	6	7	D	0	3	1		K	S	0	1							
	6	8	D	0	3	2		K	S	0	1							
	6	9	D	0	3	3		K	S	0	1							
	7	0	D	0	3	4		K	S	0	1							
	7	1	D	0	3	5		K	S	0	1							
	7	2	D	0	3	6		K	S	0	1							
	7	3	D	0	3	7		K	S	0	1							
	7	4	D	0	3	8		K	S	0	1							
	7	5	D	0	3	9		K	S	0	1							
	7	6	D	0	4	0		K	S	0	1							
	7	7	D	0	4	1		K	S	0	1							
	7	8	D	0	4	2		K	S	0	1							
	7	9	D	0	4	3		K	S	0	1							
	8	0	W	P	C	B		K	S	0	1							
	8	1	W	P	0	1		K	S	0	1							
	8	2	W	P	0	2		K	S	0	1							
	8	3	W	P	0	3		K	S	0	1							
	8	4	W	S	C	2		K	S	0	1							
	8	5	W	T	0	1		K	S	0	1							
	8	6	W	T	0	2		K	S	0	1							
	8	7	F	0	0	1		K	S	0	1							
	8	8	F	0	0	2		K	S	0	1							
	8	9	F	0	0	3		K	S	0	1							
	9	0	F	0	0	4		K	S	0	1							
	9	1	F	0	0	5		K	S	0	1							
	9	2	F	0	0	6		K	S	0	1							
	9	3	F	0	0	7		K	S	0	1							
	9	4	F	0	0	8		K	S	0	1							
	9	5	F	0	0	9		K	S	0	1							
	9	6	F	0	1	0		K	S	0	1							
	9	7	F	0	1	1		K	S	0	1							
	9	8	F	0	1	2		K	S	0	1							
	9	9	F	0	1	9		K	S	0	1							
1	0	0	F	0	2	0		K	S	0	1							

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
101	F021		K	S01	
102	F022		K	S01	
103	F023		K	S01	
104	F026		K	S01	
105	F027		K	S01	
106	F028		K	S01	
107	F039		K	S01	
108	U001		K	S01	
109	U002		K	S01	
110	U003		K	S01	
111	U004		K	S01	
112	U005		K	S01	
113	U006		K	S01	
114	U007		K	S01	
115	U008		K	S01	
116	U009		K	S01	
117	U010		K	S01	
118	U011		K	S01	
119	U012		K	S01	
120	U014		K	S01	
121	U015		K	S01	
122	U016		K	S01	
123	U017		K	S01	
124	U018		K	S01	
125	U019		K	S01	
126	U020		K	S01	
127	U021		K	S01	
128	U022		K	S01	
129	U023		K	S01	
130	U024		K	S01	
131	U025		K	S01	
132	U026		K	S01	
133	U027		K	S01	
134	U028		K	S01	
135	U029		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
136	U030		K	S01	
137	U031		K	S01	
138	U032		K	S01	
139	U033		K	S01	
140	U034		K	S01	
141	U035		K	S01	
142	U036		K	S01	
143	U037		K	S01	
144	U038		K	S01	
145	U039		K	S01	
146	U041		K	S01	
147	U042		K	S01	
148	U043		K	S01	
149	U044		K	S01	
150	U045		K	S01	
151	U046		K	S01	
152	U047		K	S01	
153	U048		K	S01	
154	U049		K	S01	
155	U050		K	S01	
156	U051		K	S01	
157	U052		K	S01	
158	U053		K	S01	
159	U055		K	S01	
160	U056		K	S01	
161	U057		K	S01	
162	U058		K	S01	
163	U059		K	S01	
164	U060		K	S01	
165	U061		K	S01	
166	U062		K	S01	
167	U063		K	S01	
168	U064		K	S01	
169	U066		K	S01	
170	U067		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
171	U068		K	S01	
172	U069		K	S01	
173	U070		K	S01	
174	U071		K	S01	
175	U072		K	S01	
176	U073		K	S01	
177	U074		K	S01	
178	U075		K	S01	
179	U076		K	S01	
180	U077		K	S01	
181	U078		K	S01	
182	U079		K	S01	
183	U080		K	S01	
184	U081		K	S01	
185	U082		K	S01	
186	U083		K	S01	
187	U084		K	S01	
188	U085		K	S01	
189	U086		K	S01	
190	U087		K	S01	
191	U088		K	S01	
192	U089		K	S01	
193	U090		K	S01	
194	U091		K	S01	
195	U092		K	S01	
196	U093		K	S01	
197	U094		K	S01	
198	U095		K	S01	
199	U096		K	S01	
200	U097		K	S01	
201	U098		K	S01	
202	U099		K	S01	
203	U101		K	S01	
204	U102		K	S01	
205	U103		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process	
				(1) Process Codes (enter)	(2) Process Description [If a code is not entered in D (1)]
206	U105		K	S01	
207	U106		K	S01	
208	U107		K	S01	
209	U108		K	S01	
210	U109		K	S01	
211	U110		K	S01	
212	U111		K	S01	
213	U112		K	S01	
214	U113		K	S01	
215	U114		K	S01	
216	U115		K	S01	
217	U116		K	S01	
218	U117		K	S01	
219	U118		K	S01	
220	U119		K	S01	
221	U120		K	S01	
222	U121		K	S01	
223	U122		K	S01	
224	U123		K	S01	
225	U124		K	S01	
226	U125		K	S01	
227	U126		K	S01	
228	U127		K	S01	
229	U128		K	S01	
230	U129		K	S01	
231	U130		K	S01	
232	U131		K	S01	
233	U132		K	S01	
234	U133		K	S01	
235	U134		K	S01	
236	U135		K	S01	
237	U136		K	S01	
238	U137		K	S01	
239	U138		K	S01	
240	U140		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
241	U141		K	S01	
242	U142		K	S01	
243	U143		K	S01	
244	U144		K	S01	
245	U145		K	S01	
246	U146		K	S01	
247	U147		K	S01	
248	U148		K	S01	
249	U149		K	S01	
250	U150		K	S01	
251	U151		K	S01	
252	U152		K	S01	
253	U153		K	S01	
254	U154		K	S01	
255	U155		K	S01	
256	U156		K	S01	
257	U157		K	S01	
258	U158		K	S01	
259	U159		K	S01	
260	U160		K	S01	
261	U161		K	S01	
262	U162		K	S01	
263	U163		K	S01	
264	U164		K	S01	
265	U165		K	S01	
266	U166		K	S01	
267	U167		K	S01	
268	U168		K	S01	
269	U169		K	S01	
270	U170		K	S01	
271	U171		K	S01	
272	U172		K	S01	
273	U173		K	S01	
274	U174		K	S01	
275	U176		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
276	U177		K	S01	
277	U178		K	S01	
278	U179		K	S01	
279	U180		K	S01	
280	U181		K	S01	
281	U182		K	S01	
282	U183		K	S01	
283	U184		K	S01	
284	U185		K	S01	
285	U186		K	S01	
286	U187		K	S01	
287	U188		K	S01	
288	U189		K	S01	
289	U190		K	S01	
290	U191		K	S01	
291	U192		K	S01	
292	U193		K	S01	
293	U194		K	S01	
294	U199		K	S01	
295	U200		K	S01	
296	U201		K	S01	
297	U202		K	S01	
298	U203		K	S01	
299	U204		K	S01	
300	U205		K	S01	
301	U206		K	S01	
302	U207		K	S01	
303	U208		K	S01	
304	U209		K	S01	
305	U210		K	S01	
306	U211		K	S01	
307	U212		K	S01	
308	U213		K	S01	
309	U214		K	S01	
310	U215		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
311	U216		K	S01	
312	U217		K	S01	
313	U218		K	S01	
314	U219		K	S01	
315	U220		K	S01	
316	U221		K	S01	
317	U222		K	S01	
318	U223		K	S01	
319	U225		K	S01	
320	U226		K	S01	
321	U227		K	S01	
322	U228		K	S01	
323	U234		K	S01	
324	U235		K	S01	
325	U236		K	S01	
326	U237		K	S01	
327	U238		K	S01	
328	U239		K	S01	
329	U240		K	S01	
330	U243		K	S01	
331	U244		K	S01	
332	U246		K	S01	
333	U247		K	S01	
334	U248		K	S01	
335	U249		K	S01	
336	U271		K	S01	
337	U278		K	S01	
338	U279		K	S01	
339	U280		K	S01	
340	U328		K	S01	
341	U353		K	S01	
342	U359		K	S01	
343	U364		K	S01	
344	U367		K	S01	
345	U372		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
346	U373		K	S01	
347	U387		K	S01	
348	U389		K	S01	
349	U394		K	S01	
350	U395		K	S01	
351	U404		K	S01	
352	U409		K	S01	
353	U410		K	S01	
354	U411		K	S01	
355	P001		K	S01	
356	P002		K	S01	
357	P003		K	S01	
358	P004		K	S01	
359	P005		K	S01	
360	P006		K	S01	
361	P007		K	S01	
362	P008		K	S01	
363	P009		K	S01	
364	P010		K	S01	
365	P011		K	S01	
366	P012		K	S01	
367	P013		K	S01	
368	P014		K	S01	
369	P015		K	S01	
370	P016		K	S01	
371	P017		K	S01	
372	P018		K	S01	
373	P020		K	S01	
374	P021		K	S01	
375	P022		K	S01	
376	P023		K	S01	
377	P024		K	S01	
378	P026		K	S01	
379	P027		K	S01	
380	P028		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)			D. Process (2) Process Description [If a code is not entered in D (1)]
381	P029		K	S01			
382	P030		K	S01			
383	P031		K	S01			
384	P033		K	S01			
385	P034		K	S01			
386	P036		K	S01			
387	P037		K	S01			
388	P038		K	S01			
389	P039		K	S01			
390	P040		K	S01			
391	P041		K	S01			
392	P042		K	S01			
393	P043		K	S01			
394	P044		K	S01			
395	P045		K	S01			
396	P046		K	S01			
397	P047		K	S01			
398	P048		K	S01			
399	P049		K	S01			
400	P050		K	S01			
401	P051		K	S01			
402	P054		K	S01			
403	P056		K	S01			
404	P057		K	S01			
405	P058		K	S01			
406	P059		K	S01			
407	P050		K	S01			
408	P062		K	S01			
409	P063		K	S01			
410	P064		K	S01			
411	P065		K	S01			
412	P066		K	S01			
413	P067		K	S01			
414	P068		K	S01			
415	P069		K	S01			

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number			A. Dangerous Waste No. (enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process									
									(1) Process Codes (enter)									(2) Process Description [If a code is not entered in D (1)]
4	1	6	P	0	7	0		K	S	0	1							
4	1	7	P	0	7	1		K	S	0	1							
4	1	8	P	0	7	2		K	S	0	1							
4	1	9	P	0	7	3		K	S	0	1							
4	2	0	P	0	7	4		K	S	0	1							
4	2	1	P	0	7	5		K	S	0	1							
4	2	2	P	0	7	6		K	S	0	1							
4	2	3	P	0	7	7		K	S	0	1							
4	2	4	P	0	7	8		K	S	0	1							
4	2	5	P	0	8	1		K	S	0	1							
4	2	6	P	0	8	2		K	S	0	1							
4	2	7	P	0	8	4		K	S	0	1							
4	2	8	P	0	8	5		K	S	0	1							
4	2	9	P	0	8	7		K	S	0	1							
4	3	0	P	0	8	8		K	S	0	1							
4	3	1	P	0	8	9		K	S	0	1							
4	3	2	P	0	9	2		K	S	0	1							
4	3	3	P	0	9	3		K	S	0	1							
4	3	4	P	0	9	4		K	S	0	1							
4	3	5	P	0	9	5		K	S	0	1							
4	3	6	P	0	9	6		K	S	0	1							
4	3	7	P	0	9	7		K	S	0	1							
4	3	8	P	0	9	8		K	S	0	1							
4	3	9	P	0	9	9		K	S	0	1							
4	4	0	P	1	0	1		K	S	0	1							
4	4	1	P	1	0	2		K	S	0	1							
4	4	2	P	1	0	3		K	S	0	1							
4	4	3	P	1	0	4		K	S	0	1							
4	4	4	P	1	0	5		K	S	0	1							
4	4	5	P	1	0	6		K	S	0	1							
4	4	6	P	1	0	7		K	S	0	1							
4	4	7	P	1	0	8		K	S	0	1							
4	4	8	P	1	0	9		K	S	0	1							
4	4	9	P	1	1	0		K	S	0	1							
4	5	0	P	1	1	1		K	S	0	1							

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process (1) Process Codes (enter)	D. Process (2) Process Description [If a code is not entered in D (1)]
451	P112		K	S01	
452	P113		K	S01	
453	P114		K	S01	
454	P115		K	S01	
455	P116		K	S01	
456	P118		K	S01	
457	P119		K	S01	
458	P120		K	S01	
459	P121		K	S01	
460	P122		K	S01	
461	P123		K	S01	
462	P127		K	S01	
463	P128		K	S01	
464	P185		K	S01	
465	P188		K	S01	
466	P189		K	S01	
467	P190		K	S01	
468	P191		K	S01	
469	P192		K	S01	
470	P194		K	S01	
471	P196		K	S01	
472	P197		K	S01	
473	P198		K	S01	
474	P199		K	S01	
475	P201		K	S01	
476	P202		K	S01	
477	P203		K	S01	
478	P204		K	S01	
479	P205		K	S01	
480	WL02		K	S01	

EPA/State ID Number	W	A	7	8	9	0	0	0	8	9	6	7

Line Number	A. Dangerous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Process	
				(1) Process Codes (enter)	(2) Process Description [If a code is not entered in D (1)]

XV. Map

Attach to this application a topographic map of the area extending to at least one (1) mile beyond property boundaries. The map must show the outline of the facility; the location of each of its existing and proposed intake and discharge structures; each of its dangerous waste treatment, storage, recycling, or disposal units; and each well where fluids are injected underground. Include all springs, rivers, and other surface water bodies in this map area, plus drinking water wells listed in public records or otherwise known to the applicant within ¼ mile of the facility property boundary. The Instructions provide additional information on meeting these requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (refer to Instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, recycling, and disposal areas; and sites of future storage, treatment, recycling, or disposal areas (refer to Instructions for more detail).

XVIII. Certifications

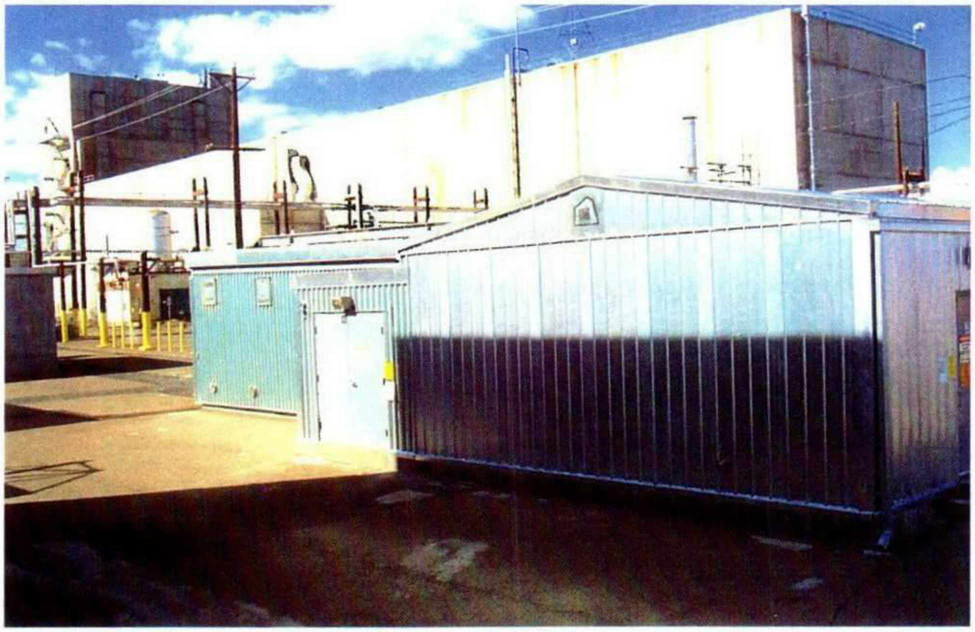
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Operator* Name and Official Title (type or print) Roy J. Schepens, Manager U.S. Department of Energy Office of River Protection for	**Signature**	**Date Signed** 9/18/06
Co-Operator** Name and Official Title (type or print) Mark S. Spears President and Chief Executive Officer CH2M HILL Hanford Group, Inc.	**Signature** for Mark Spears	**Date Signed** 8/30/06
Co-Operator** – Address and Telephone Number 2440 Stevens Center P.O. Box 1500 Richland, WA 99352 (509) 373-1677		
Facility-Property Owner* Name and Official Title (type or print) Roy J. Schepens, Manager U.S. Department of Energy Office of River Protection for	**Signature**	**Date Signed** 9/18/06

Comments

This unit was previously known as the 222-S Laboratory Complex. The name was changed to the 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal (TSD) unit to clarify the boundaries of the TSD units subject to this permit. "TSD component" is used to define a subdivision of the overall TSD unit.

222-S Dangerous and Mixed Waste TSD Components



219-S Waste Handling Facility

00100005-2CN
Photo Taken 2000

Dangerous and Mixed Waste Storage Area

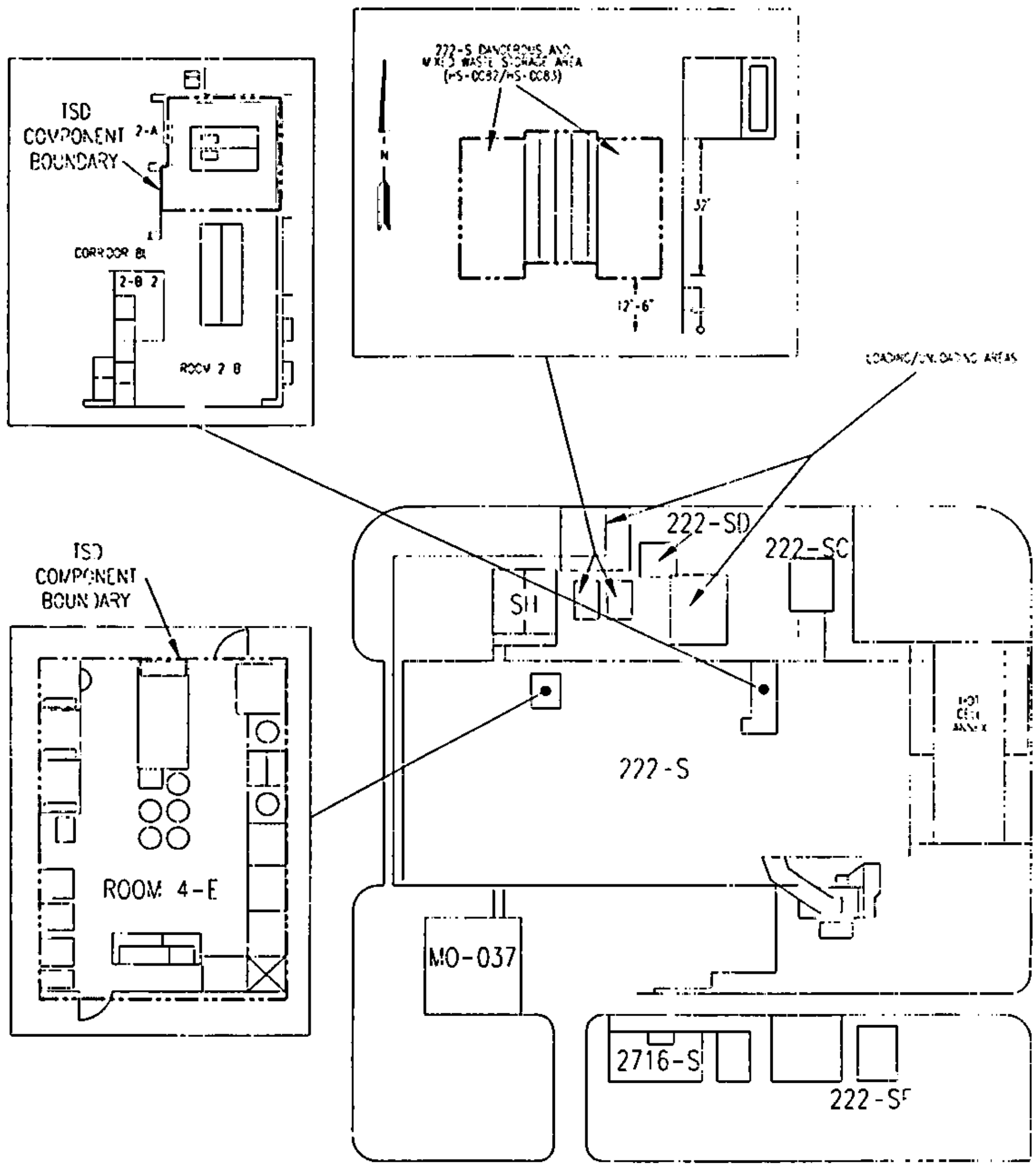
98110210-13.JPG
Photo Taken 1998

222-S Dangerous and Mixed Waste TSD Components

Room 2-B Photo Taken 2006

Room 4-E Photo Taken 2006

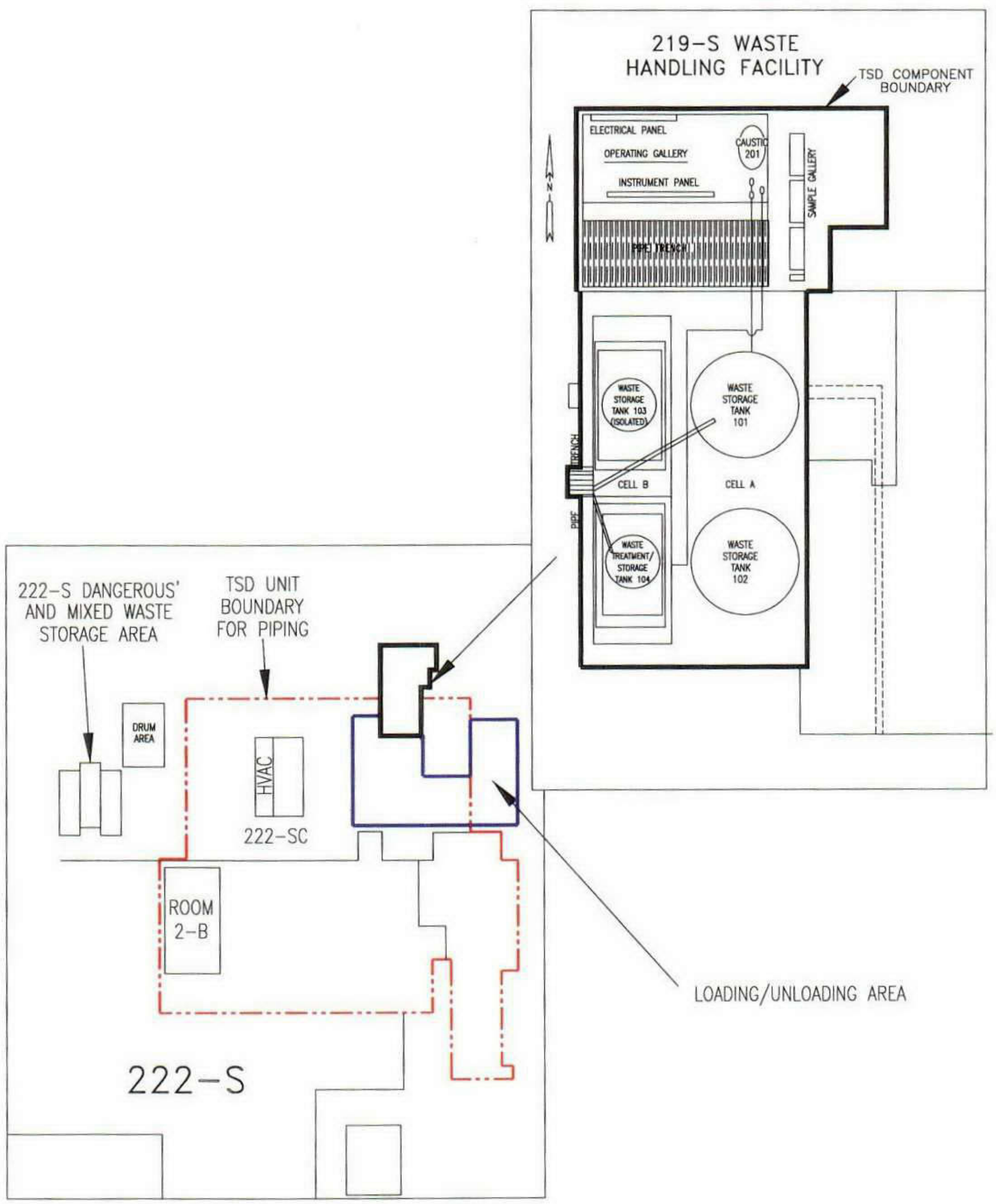
222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal Unit Container Storage Areas



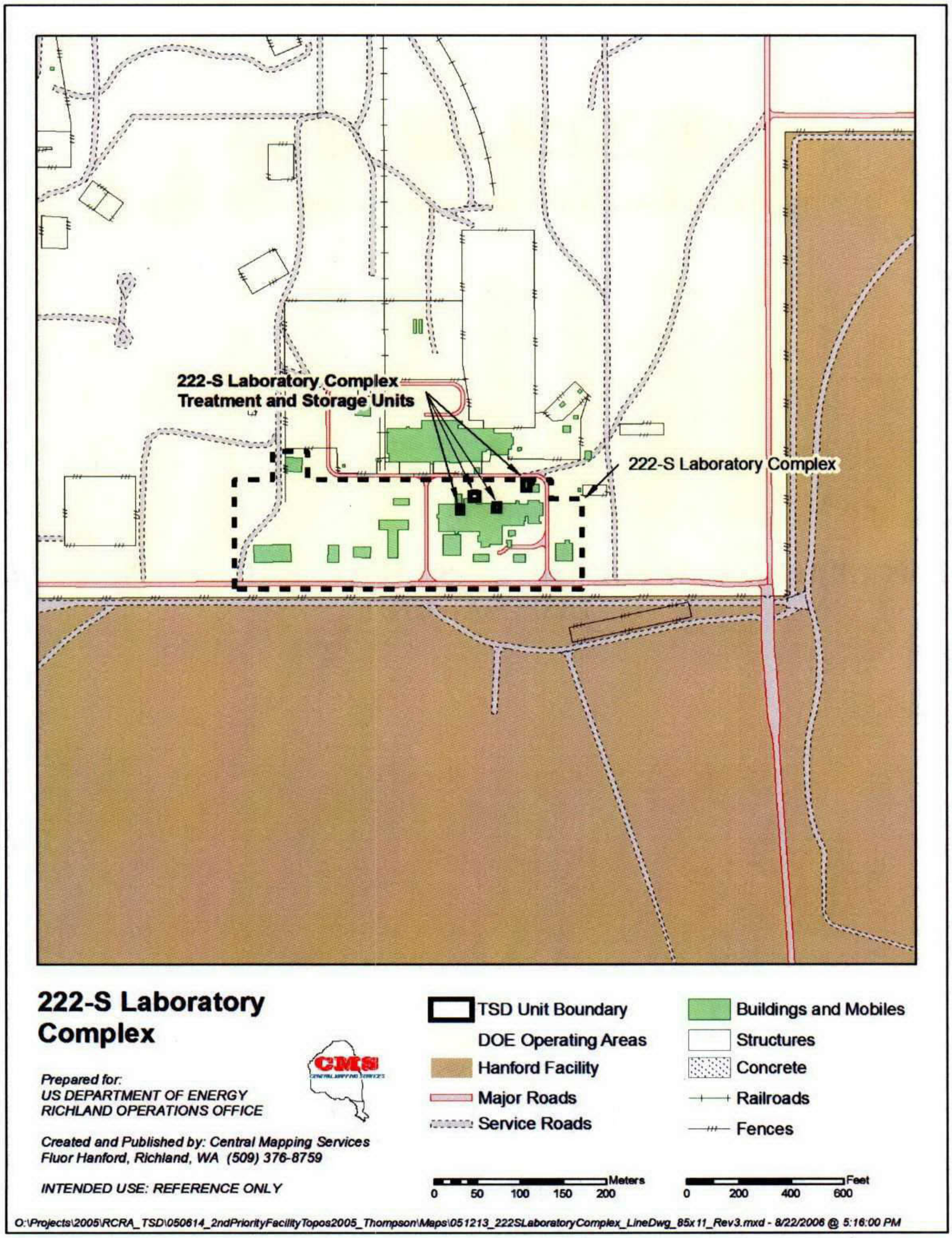
CONTAINER STORAGE AREAS

222-S Dangerous Waste Storage and Treatment Unit

Tank System Treatment and Storage Area



222-S TSD UNIT SITE PLAN



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TOPOGRAPHIC MAP FOR THE 222-S TREATMENT, STORAGE, AND DISPOSAL UNIT

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Chapter 2.0

CONTENTS

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2.0 FACILITY DESCRIPTION AND GENERAL PROVISIONS [B AND E]

The 222-S Laboratory Complex describes the geographical boundary established in the *Building Emergency Plan for the 222-S Laboratory Complex* (HNF-IP-0263-222S). The 222-S Laboratory Complex contains laboratory areas, maintenance areas, operations areas, administrative buildings, and the 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal (TSD) unit. The 222-S TSD unit is comprised of four TSD components:

- 219-S Waste Handling Facility—tank storage and treatment
- 222-S Dangerous and Mixed Waste Storage Area (DMWSA)—container storage
- Room 4-E—container storage
- Room 2-B (northern portion)—container storage.

The 222-S Laboratory Complex is located in the 200 West Area of the Hanford Facility and began laboratory and waste management operations in June of 1951 (Part A Form).

The 222-S TSD unit (four components) is the subject of this application. The individual TSD components manage dangerous and/or mixed waste generated from within the geographical boundary of the 222-S Laboratory Complex (i.e., generated during the course of analytical work, maintenance, operations, and decontamination of equipment) and from other waste management units on the Hanford Facility or from offsite generators (see Appendix 3B). The four TSD components are described in Section 2.1 and Chapter 4.0 of this application. A detailed discussion on waste types and known characteristics is provided in Chapter 3.0 and Appendix 3A of this application.

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the *Atomic Energy Act of 1954*, as amended) is incorporated into this document, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit or Chapter 70.105, "Hazardous waste management," of the Revised Code of Washington and its implementing regulations but is provided for information purposes only.

2.1 222-S LABORATORIES AND TREATMENT, STORAGE, AND DISPOSAL UNIT DESCRIPTION [B-1]

The 222-S Laboratory was constructed in 1950 and 1951 to provide analytical services and support to the Hanford Reduction Oxidation Plant located in the 200 West Area. The 222-SA Laboratory is a five-wide trailer built in 1980 southeast of the 222-S Laboratory.

Through the years, the 222-S Laboratories operation, structures, and equipment have been updated to meet changes in the requirements, such as U.S. Department of Energy Orders and federal and state regulations.

The current mission of the 222-S Laboratory is to provide quality analytical chemistry services in support of, but not limited to, Hanford Facility TSD units, processing units, environmental monitoring programs, treatability studies, and onsite generating units and offsite generator (Appendix 3B) activities. The 222-S Laboratory analyzes and tests samples of many different media, including hazardous waste. Hazardous waste collected for analysis or treatability studies are conditionally exempt from the hazardous waste storage and treatment requirements in accordance with *Washington Administrative Code* (WAC), "Dangerous Waste Regulations," 173-303-071(l), (r), and (s). Therefore, analytical and testing activities involved in analysis and treatability studies are not subject to this permit. Any hazardous or mixed waste generated during the conduct of these activities is considered a new point of generation as defined in the Waste Analysis Plan (Appendix 3A).

The current mission of the 222-SA Laboratory is to prepare nonradioactive standards and reagents for the 222-S Laboratory and other Hanford analytical laboratories. This laboratory is also used for nonradioactive development work. Both dangerous and nonregulated waste is generated. Dangerous waste is accumulated in satellite accumulation areas (SAA) and then packaged for storage in either one of the 222-S TSD components (i.e., DMWSA) or a less than 90-day accumulation area. The dangerous waste can be stored at the DMWSA while awaiting shipment offsite to a permitted TSD for treatment.

The mission of the 222-S TSD unit is to provide treatment and storage areas for solid and/or liquid dangerous and/or mixed waste in support of the 222-S Laboratory Complex mission, Hanford contractors, and offsite missions as allowed by the Settlement Agreement in Appendix 3B.

The following general sources describe the types of dangerous and/or mixed waste managed in the 222-S TSD units:

a. Waste generated within the 222-S Laboratory Complex.
   1. Analytical waste resulting from sample analysis.
   2. Discarded chemical products from laboratory reagents/standards.
   3. Waste from chemicals synthesized or created during research activities.
   4. Unused samples.
   5. Maintenance/construction project waste.

b. Off-unit/offsite[1] waste.

Sections 2.1.1 through 2.1.4 briefly describe the four 222-S TSD components. A more detailed description is provided in Chapter 4.0.

[1] *Settlement Agreement re: Washington v. Bodman*, Civil No. 2:03-cv-05018-AAM, U.S. Department of Energy and Washington State Department of Ecology, dated January 6, 2006. (See DOE/RL-91-27, Rev. 2, Appendix 3B.)

2.1.1 219-S Waste Handling Facility

The 219-S Waste Handling Facility located northeast of the 222-S Laboratory (refer to Part A topographic map) is used for the storage and treatment of liquid mixed and radiological waste and includes an operating gallery, sample gallery, and 219-S Tank System. The 219-S Waste Handling Facility contains four stainless steel tanks: tanks 101 (15,140 liters), 102 (15,140 liters), 103 (6,056 liters), and 104 (7,192 liters), associated ancillary equipment (see Chapter 4.0, Table 4-2), secondary containment vaults, and leak detection. Tank 103 has been emptied, isolated, and triple rinsed (see Chapter 4.0) and will remain in place until final closure of the tank system (see Chapter 11.0). The 219-S Tank System also includes the piping and leak detection from the point of the piping originating in the 222-S Laboratory through the waste tanks and associated piping to the exterior wall of the waste tank vault for the waste lines associated with waste transfer to the tank farms. The piping from the 222-S Laboratory, as part of the 219-S Tank System, originates in several locations throughout the building. The lines are encased for secondary containment from the point of origin at the laboratory locations to the secondary containment for the waste tanks.

Tanks 101 and 104 are used for storage of mixed waste and treatment. Treatment of the waste in tank 101 and tank 104 is a best management practice not a regulatory requirement (not intended to change or eliminate existing waste numbers). This treatment is intended to extend the life of the tank beyond the predicted design life by reducing the corrosion caused by some of the acids in the tank. Treatment of the waste may occur in tank 101 or 104 with the transfer of caustic and/or sodium nitrite to the tanks utilizing the drains lines in lab Room 2-B or hot cells.

Mixed waste is transferred from tanks 101 and 104 to tank 102 for treatment and storage before transfer to the Double-Shell Tank (DST) System. Mixed waste that is transferred from tank 102 to the DST System is treated with sodium hydroxide (NaOH) and sodium nitrite ($NaNO_2$) to meet DST System waste acceptance criteria for safe storage. Refer to Chapter 4.0 for further details on tank system design and operation. Refer to Appendix 3A for waste acceptance criteria.

2.1.2 222-S Dangerous and Mixed Waste Storage Area (DMWSA)

The 222-S DMWSA is located to the north of the 222-S Laboratory. The 222-S DMWSA consists of two metal storage structures (refer to Part A Form, Chapter 1.0). The 222-S DMWSA stores various-sized approved containers or other approved packages and overpacks of dangerous and/or mixed waste. The 222-S DMWSA is used for packaging, repackaging, sampling, and storage of dangerous and/or mixed waste. The containers are stored at the 222-S DMWSA until transferred to another 222-S Laboratory treatment and/or storage unit, an onsite TSD unit, or to an offsite TSD facility (see Appendix 3B). Refer to Chapter 4.0 for further details on 222-S DMWSA design and operation. Refer to Appendix 3A for waste acceptance criteria.

2.1.3 Room 2-B

The northern portion of Room 2-B, located within the 222-S Laboratory, provides container storage of solid and/or liquid mixed waste (refer to Chapter 1.0) until transferred to another 222-S TSD unit, an onsite TSD unit, or to an offsite TSD facility (see Appendix 3B). The 222-S TSD component located in Room 2-B is used for packaging, repackaging, sampling, and storage of mixed waste, is physically isolated from the rest of the room, and is locked and controlled by facility management to prevent unauthorized personnel from entering. Appendix 3A and Chapter 4.0 provide the additional details of waste management activities in Room 2-B storage area.

Within Room 2-B, TSD component is Hood 16 and associated sinks. The sinks are an introduction point for transfer of liquid mixed and radiological waste from containers to the 219-S Tank System. The liquid waste introduced into the 219-S Tank System from Hood 16 sinks consists of unused sample portions, unused sample dilutions, expired reagents, analytical waste from sample analysis or treatability studies, standards materials, and other wastes that have been approved as meeting 219-S Tank System waste acceptance criteria (see Appendix 3A). The liquid waste may be poured out of the containers into the hood sink drains or slurped into the drain system using an air-operated aspirator. Liquid mixed waste that has been approved, but exceeds personnel protection radiological levels for handling at Hood 16 during transfer, is introduced into the 219-S Tank System via drains in hot cells. Refer to Chapter 4.0 for further details on Room 2-B design and operation. Refer to Appendix 3A for waste acceptance criteria.

Note that the remainder southern portion of the Room 2-B is dedicated to sample storage and other analytical processes, which are not subject to this permit and therefore will not be discussed further.

2.1.4 Room 4-E

Room 4-E TSD component, located within the 222-S Laboratory, provides container storage of solid and/or liquid mixed waste (refer to Chapter 1.0) until transferred to another 222-S TSD component, an onsite TSD unit, or to an offsite TSD facility as allowed by the Settlement Agreement (Appendix 3B). Room 4-E is used for packaging, repackaging, sampling, and storage of mixed waste. Room 4-E is locked and controlled by facility management to prevent unauthorized personnel from entering. Refer to Chapter 4.0 for further details on Room 4-E design and operation. Refer to Appendix 3A for waste acceptance criteria.

2.1.5 Other Environmental Permits

All environmental permits that are required to support operation of the 222-S Laboratory are identified in Section X of the Part A Form (Chapter 1.0)

2.1.6 Construction Schedule

Any proposed new construction for dangerous and/or mixed waste operations will be managed as described in the *Hanford Facility Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste.*

2.1.7 Seismic Consideration

The 222-S Laboratory was constructed in 1951 in accordance with the 1949 edition of the Uniform Building Code (UBC). The Room 2-B and Room 4-E storage areas are located within the confines of the 222-S Laboratory and meet the construction criteria.

The concrete vault area of the 219-S Tank System was constructed in 1951 in accordance with the 1949 edition of the UBC. The 219-S Tank System was upgraded in 1999 in accordance with WAC 173-303-640, "Tank Systems," and the 1994 edition of the UBC. All tank system upgrades were certified by an independent qualified registered professional engineer (IQRPE) in accordance with WAC-173-303-810(13)(a).

The 222-S DMWSA structures were designed, fabricated, and installed in accordance with the requirements of WAC-173-303-630 and the 1997 edition of the UBC.

2.2 TOPOGRAPHIC MAP [B-2]

A topographic map is located in the Part A Form (Chapter 1.0). Refer to the *Hanford Facility Dangerous Waste Permit Application, General Information Portion* (DOE/RL-91-28), Chapter 2.0, for information on the 100-year floodplain area, surface waters, surrounding land uses, and legal boundaries of the Hanford Facility. The loading and unloading areas are shown in Chapter 1.0 and further described in Chapter 4.0.

2.3 ROADWAY TRAFFIC TO THE 222-S LABORATORY COMPLEX [B-4]

General traffic information for the Hanford Facility is presented in DOE/RL-91-28. Access to the 222-S Laboratory Complex is provided by 10th Street to the south and Beloit Avenue to the east. These roads are constructed of bituminous asphalt that provides satisfactory all-weather access. Paved parking areas are provided for 222-S Laboratory Complex personnel. The asphalt pad between the 222-S Laboratory and the 219-S Waste Handling Facility is used for foot traffic, maintenance vehicles, sample delivery vehicles, and staging area from 219-S Waste Handling Facility transfers. Transfer lines between the 222-S Laboratory and the 219-S Waste Handling Facility were designed and constructed to maintain integrity when subjected to anticipated traffic patterns.

2.4 RELEASE FROM SOLID WASTE MANAGEMENT UNITS [E]

Information concerning solid waste management units (SWMU) and releases from SWMUs is generally discussed in DOE/RL-91-28. Specific information for the 222-S TSD unit is provided in Chapter 11. Information on known releases from the 222-S TSD unit operations is also addressed in Chapter 11.0. The SMWUs and known releases associated with the 222-S TSD unit are also identified on the 222-S Topographic map (Part A Form).

Chapter 3.0

CONTENTS

APPENDIXES

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3.0 WASTE ANALYSIS [C]

This chapter provides information on the chemical, biological, and physical characteristics of the waste treated and stored at the 222-S Laboratory Complex. The information includes descriptions required by WAC 173-303-300(5) and (6) contained in the *Waste Analysis Plan for the 222-S Treatment, Storage, and Disposal Unit* (Appendix 3A).

3.1 CHEMICAL, BIOLOGICAL, AND PHYSICAL ANALYSIS [C-1]

Dangerous and/or mixed waste is generated from within the geographical boundary of the 222-S Laboratory Complex (i.e., generated during the course of analytical work, maintenance, operations, and decontamination of equipment) and from other waste management units on the Hanford Facility or from offsite generators (Appendix 3B). Dangerous and/or mixed waste generated from within the 222-S Laboratory Complex is managed under the on-unit provisions of this Waste Analysis Plan (Appendix 3A, Section 1.2.1).

Dangerous waste stored in the 222-S DMWSA is received from waste generation activities within the 222-S Laboratory Complex. Mixed waste stored in the 222-S DMWSA, Room 2-B, Room 4-E, and the 219-S Waste Handling Facility (219-S Tank System) is received from waste generation activities within the 222-S Laboratory Complex, from other onsite generating units (off-unit), and from offsite generators (Appendix 3B).

Dangerous and/or mixed waste transferred to the 222-S Laboratory Complex is assigned dangerous waste numbers found in Chapter 1.0. The dangerous waste numbers for liquid mixed waste managed in the 219-S Waste Handling Facility are based on the dangerous waste numbers for the Double-Shell Tank System Part A Form. The waste codes managed by the 219-S Waste Handling Facility at a minimum must not exceed those managed by the DST System because the majority of the waste managed by the 219-S Waste Handling Facility is directly transferred via pipeline into the 241-SY Farm.

Dangerous waste numbers for containerized waste management within the 222-S DMWSA, Room 2-B, and Room 4-E are also identified on the Part A Form. The extensive list of 'U' and 'P' dangerous waste numbers identified allow for management of a large variety of analytes resulting from unused calibration standards, reagents, and chemicals.

3.2 WASTE ANALYSIS PLAN [C-2]

The Waste Analysis Plan (Appendix 3A) summarizes waste acceptance processes and contains the following information: unit description, confirmation process, selection of waste analysis parameters, selection of sampling processes, selection of a laboratory, laboratory testing and analytical methods, selection of waste reevaluation frequencies, special procedural requirements, and recordkeeping requirements.

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Chapter 4.0

CONTENTS

APPENDIXES

FIGURES

TABLE

4.0 PROCESS INFORMATION [D]

This chapter discusses the processes and equipment used for treatment and storage of dangerous and mixed waste in the 222-S TSD unit. The 222-S TSD unit can receive, package, repackage, sample, treat, and store dangerous and/or mixed waste from onsite generating units and/or offsite generators (Appendix 3B). All incoming dangerous and/or mixed waste received at the 222-S TSD unit is managed in accordance with WAC 173-303. Engineering drawings are provided in Appendix 4A and engineering assessment reports are provided in Appendix 4B.

Note that although the 222-S TSD unit (Section 4.1) is part of the 222-S Laboratory Complex (see Chapter 2.0 for general description), the overall 222-S Laboratory Complex is not subject to this permit. Therefore the areas managing dangerous and/or mixed waste that are within the 222-S Laboratory Complex but outside the 222-S TSD unit boundary do so pursuant to the generator requirements (WAC 173-303-200). These non-permitted areas that may manage dangerous and/or mixed waste include the 222-S Laboratory, 222-SA Laboratory, 90-day accumulation areas, and satellite accumulation areas.

Areas within the TSD unit boundary that do not manage dangerous and/or mixed waste include specific sections of the 219-S Waste Handling Facility (planning room, change room, and buffer area room) and the southern portion of Room 2-B. These areas are not subject to this permit.

Where information regarding treatment, management, and disposal of the radioactive source, byproduct material, and/or special nuclear components of mixed waste (as defined by the *Atomic Energy Act of 1954*, as amended) is incorporated into this document, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit or Chapter 70.105, "Hazardous waste management," of the Revised Code of Washington and its implementing regulations but is provided for information purposes only.

4.1 STORAGE AND TREATMENT

The 222-S TSD unit has the following four TSD components used for the treatment and storage of solid and/or liquid dangerous and/or mixed waste:

- 222-S DMWSA—Container storage of solid and/or liquid dangerous and/or mixed waste (Figure 4-1)

- Room 2-B storage area (northern portion of Room 2-B)—Container storage of solid and/or liquid mixed waste (Figure 4-2)

- Room 4-E—Container storage of solid and/or liquid mixed waste (Figure 4-3)

- 219-S Waste Handling Facility—Tank system for treatment and storage of liquid mixed waste (Figure 4-4).

The mission of the 222-S TSD unit and individual components is to provide treatment and storage areas for solid and/or liquid dangerous and/or mixed waste in support of the 222-S Laboratory Complex mission, Hanford contractor, and offsite missions (Appendix 3B).

4.1.1 Container Storage

Room 2-B (northern portion of Room 2-B) provides container storage of solid and/or liquid mixed waste and is isolated from the remainder of the room with an accordion gate with physical controls. Access to the TSD portion of the room is controlled and granted by facility management. The remainder of Room 2-B is dedicated to sample storage and other analytical processes. The maximum storage capacity in Room 2-B is 2,500 liters. The capacity of storage is based on the space available for container storage, including double-stacking, and to maintain a minimum of 76-centimeter aisle spacing [WAC 173-303-630(5)] and safe emergency egress. Figure 4-2 shows a typical container configuration in Room 2-B. Note that double-stacking of 208-liter drums is not currently performed because the required equipment is not available at the TSD unit.

Room 4-E provides container storage of solid and/or liquid mixed waste. The maximum permitted storage capacity in Room 4-E is 1,450 liters. This permitted storage capacity is based on the number of storage cabinets and drums as required. Drum storage is also limited by the aisle spacing requirement of 76-centimeters. The size and configuration of Room 4-E would allow for more storage capacity, but the quantities will be controlled to the permitted storage capacity. Figure 4-3 shows a typical container configuration in Room 4-E.

The 222-S DMWSA is located on the north side of the 222-S Laboratory and consists of two metal storage structures that have been placed on an elevated platform. Each structure is divided into two cells (four total). The maximum process design capacity for container storage in the 222-S DMWSA (Figure 4-1) is 24,520 liters. This capacity is based on the available storage area of the DMWSA and allows for double-stacking of containers and a minimum of 76-centimeter aisle spacing [WAC 173-303-630(5)(c)]. Each of the four cells has secondary containment in compliance with WAC 173-303-630(7). If additional segregation is required, containers are stored on separate secondary containment devices. Details on container management and the secondary containment system are provided in Section 4.2.

4.1.2 Tank Treatment and Storage

The 219-S Waste Handling Facility TSD component, located northeast of the 222-S Laboratory (refer to Chapter 1.0), includes an operating gallery, sample gallery, and a tank system. The 219-S Tank System contains four waste tanks (tanks 101, 102, 103, and 104) associated ancillary equipment (Table 4-1), and secondary containment vaults. The process design capacity and maximum operating capacity of the four tanks is as follows: tank 101 (15,140 liters), tank 102 (15,140 liters), tank 103 (6,056 liters), and tank 104 (7,192 liters). Please note that tank 103 has been pumped, triple rinsed, disconnected, blanked, and is out of service (Figure 4-4) (refer to Chapter 11.0).

This TSD component includes the piping from the point of the pipe origin inside the 222-S Laboratory through the 219-S waste tanks and associated piping to the exterior wall of the 219-S waste tank vault for the waste lines associated with waste transfer to the tank farms.

Tanks 101 and 102 were installed when the facility was constructed in 1951, whereas tank 104 was installed and placed into service in 1996. The integrity assessments for the 219-S Tank System have been certified by an independent qualified registered professional engineer (Appendix 4B). The tanks are located in a below-ground concrete vault that has been upgraded with stainless-steel liners to comply with requirements for secondary containment in compliance with WAC-173-303-640(4). Refer to Section 4.3 for additional details of the 219-S Tank System.

Liquid mixed waste that meets the WAC (see Appendix 3A) for the 219-S Tank System is transferred to the tank system. Introduction points to the 219-S Tank System are shown in Figure 4-4. The liquid mixed waste transferred to the 219-S Tank System is normally stored and may be treated in tanks 101 and 104 in preparation for transfer to the DST System. Some or all of the waste in tanks 101 and 104 is transferred to tank 102 for treatment to meet DST waste acceptance criteria. Once waste acceptance criteria are met, transfers from tank 102 into the DST system (SY Farm) are planned.

Treatment of the waste may occur in tank 101 or 104 with the transfer of caustic and/or sodium nitrite to the tanks utilizing the drains lines in lab Room 2-B or hot cells. Sodium hydroxide may be added to tanks 101 and 104 after transfer of existing waste to tank 102. The addition of a known volume and concentration of NaOH to the tanks provides a buffering solution for the waste entering the tanks from the laboratory for storage. This treatment helps to maintain a nonacidic environment in the tank, reducing the chances of tank corrosion. No sampling of the waste to support this treatment is involved since the treatment is not intended to render the waste to meet waste acceptance criteria.

The liquid mixed waste is treated in tank 102 with sodium hydroxide and with sodium nitrite to adjust pH and provide corrosion protection. The process design capacity during tank treatment is 37,472 liters (Part A Form). The liquid mixed waste is transferred from the 219-S Tank System to the DST System, another onsite TSD unit, or to an offsite TSD facility. The interface waste management boundary between the 219-S Tank System and the DST System is the 'cold face' or outside wall of the 219-S Tank System (Appendix 4B.3).

Transfers to another onsite TSD (other than the DST System) or to an offsite TSD facility are nonroutine and require special planning and equipment. The 219-S Tank System requires reconfiguration for installation of a pump, jumpers, hoses, venting, and secondary containment for transfer of the liquid mixed waste into a tanker truck or other containers. Any temporary system reconfigurations must meet appropriate sections of WAC 173-303-640 for integrity assessment and general operations. Transfers other than through the normal underground waste lines would only be considered if the underground line waste transfer capability was not available or if the waste does not meet DST System acceptance criteria.

4.2 CONTAINERS [D-1]

Dangerous and/or mixed waste typically is stored in containers (Table 4-2). The following sections provide a description of the containers used to store the waste generated in the 222-S Laboratory Complex, a discussion of the container management practices (packaging, repackaging, and sampling) used in the three storage locations, and the requirements associated with secondary containment.

4.2.1 Description of Containers [D-1a]

Liquid dangerous and/or mixed waste is contained in liquid-tight bottles placed in labpack containers or is transferred to the 219-S Tank System. Solid dangerous and/or mixed waste is contained in cardboard, polyethylene, glass, metal, or plywood containers.

Containers are chosen based on the compatibility with the waste, consistent with the requirements in WAC 173-303-630(4). Table 4-2 lists the inner containers, sorbent materials, outer containers, and labels typically used in containerizing the stored waste.

4.2.2 Container Management Practices [D-1b]

Container management practices include packaging, repackaging, or sampling waste in containers, transferring containers to and from the 222-S DMWSA, Room 2-B storage area, and/or Room 4-E, and methods for handling and storage.

Waste handling, storage, and transfer methods are designed to ensure that dangerous and/or mixed waste containers remain closed in accordance with WAC 173-303-630(5) during storage and that containers are not opened, handled, or stored in an unsafe manner. Containers will be opened to add or remove waste, package or repackage waste, or to sample waste. Location of these activities is dependent on space, available equipment, and radiological conditions. Specific actions include, but are not limited to, the following.

- To ensure safety, the storage areas are inspected in accordance with Chapter 6, Table 6-2. Weekly inspections and inventories are made of the containers in the 222-S DMWSA, Room 2-B storage area, and Room 4-E. All inspections and inventories, which are conducted by trained personnel, are performed to ensure that containers are being stored safely and correctly (refer to Chapter 6.0 for information on inspections).

- Access to the 222-S DMWSA, Room 2-B storage area, and Room 4-E is controlled at all times. These waste areas can be accessed only by authorized personnel.

- All containers are inspected for signs of damage such as dents, distortion, corrosion, or scratched coating before being placed in use. Current operating practices indicate the use of new containers. Reused or reconditioned containers may be used but must be inspected before placed into use. All damaged or leaking containers are placed in an overpack container. Overpack containers typically are made of steel or polyethylene and selection for use is based on waste compatibility. Containers are overpacked in various areas of the 222-S Laboratory Complex based on the chemistry and physical size of the containers. Smaller containers may be overpacked in or near fume hoods to provide airflow for capture of vapors, if required. Larger containers may be moved to rooms within the 222-S Laboratory that have overhead hoists, to the 222-SD storage pad which also has a hoist, or by use of a mobile crane. Overpacked containers are moved either to an onsite TSD unit for future management or managed within the 222-S TSD.

- Only authorized personnel prepare and complete documents associated with the handling and transferring of dangerous and mixed waste.

- Spilled waste is managed in accordance with the building emergency plan (Appendix 7A). Documentation of these activities is maintained in the 222-S TSD (unit-specific) operating record. The operating record is maintained at the 222-S Laboratory Complex by 222-S TSD unit management.

- WAC 173-303-630(8)(b) requirements are met for stored ignitable and reactive waste (refer to Section 4.2.5).

Containers are segregated by waste type and compatibility before storage in the 222-S DMWSA Room 2-B and Room 4-E. Wastes are segregated by DOT hazard class and separated by use of spill pallets, pans (or equivalent devices), and storage locations. All waste containers placed into storage are entered in the operating record. All discrepancies identified on receipt of mixed waste are documented (Chapter 3.0, Appendix 3A). Discrepancies are resolved with the offeror (Appendix 3A) of the mixed waste or the transfer/shipment is rejected. Containers that require packaging, repackaging, or sampling are processed in the 222-S DMWSA, Room 2-B storage area, or Room 4-E.

4.2.2.1 Packaging and Transfer of Waste in Containers

Packaging and transfer of waste containers may occur in Room 2-B, Room 4-E, and the DMWSA. Packaging and transfer of waste containers will be documented in the TSD operating record. Documentation regarding the packaging configuration of waste includes a container inventory sheet, a physical and chemical description, type and size of container, sorbent used, labeling and marking requirements, and information on segregation requirements. After all the waste to be packaged has been placed in the container, the lid is fastened on the container and properly closed. The container is weighed and the gross weight is marked on the container. A package identification number (PIN) and quality control stamp are affixed to the outer container. The PIN is entered in the TSD operating record. Access to the containers is controlled by controlling access to the rooms. Room 2-B storage area, Room 4-E, and the DMWSA have keyed entries and only authorized personnel have access.

4.2.2.2 Storage Configuration within Room 2-B Storage Area

Generally this area will be used as extra storage space for containers of mixed waste. Containers of mixed waste are stored on portable sumps (e.g., spill pallets) in Room 2-B. A volume equal to twelve 208-liter containers (2,500 liters) can be stored within Room 2-B. Space between structures and containers is maintained at all times to allow adequate access for inspection and emergency actions. Containers with incompatible waste are separated spatially and/or by a physical barrier. Figure 4-2 shows the general layout of equipment and waste handling operations in Room 2-B storage area. More than twelve 208-liter containers can be stored including smaller containers that are stacked on larger containers provided the quantity of waste does not exceed 2,500 liters and a minimum of 76-centimeter aisle spacing is maintained.

Within the Room 2-B storage area, the 219-S Tank System boundary begins at the hood 16 sink drain pipe connection to the hood sink. This hood and associated sinks are used for sample storage and decontamination of sampling and sample transport equipment. This drain line is used to transfer liquid waste consisting of unused sample portions, unused sample dilutions, expired reagents, slop jars from sample analysis, standards materials, decontamination reagents, and other wastes that have been pre-approved as meeting the 219-S Tank System acceptance criteria. This hood is equipped with a water source which is used to rinse equipment that was decontaminated or used to flush the transfer lines after material is transferred.

4.2.2.3 Storage Configuration within Room 4-E Storage Area

This room is generally used for mixed waste container storage, packaging, repackaging, drum venting (note drum venting is not a regulatory requirement but is performed as a best management practice), and container sampling. Containers of mixed waste are stored on the floor or in portable sumps (e.g., spill pallets) in Room 4-E. A total of up to six 208-liter containers can be stored within Room 4-E. Space between structures and containers is maintained at all times to allow adequate access for inspection and emergency actions. Containers with incompatible waste are separated spatially and/or by a physical barrier. Figure 4-3 shows the general layout of equipment and waste handling operations in Room 4-E. More than six 208-liter containers can be stored including smaller containers that are stacked on larger containers provided the quantity of waste does not exceed 1,450 liters and a minimum of 76-centimeter aisle spacing is maintained. Access to this room is controlled by 222-S TSD unit management and has keyed entries.

4.2.2.4 Storage Configuration within 222-S Dangerous and Mixed Waste Storage Area

The 222-S DMWSA is divided into four cells (Figure 4-5). Generally this area is used for container storage of mixed waste and dangerous waste. Dangerous waste is typically stored separately from mixed waste. All incompatible waste is segregated by storing incompatible waste in separate containers and providing separate secondary containment. For example, corrosive waste (acid and caustic waste) is stored in separate containers and is placed in or over separate secondary containment. One possible arrangement of waste in the 222-S DMWSA is shown in Figure 4-1. The storage configuration in the 222-S DMWSA complies with the aisle space requirements in WAC 173-303-340(3) and -630(5)(c), as well as incompatible waste requirements in -630(9). The quantity of waste stored will not exceed the secondary containment capacity requirements of WAC 173-303-630(7) or the storage capacity identified in Chapter 1.0. Containers can be stacked two-high in limited circumstances (i.e., container weight and limited movement of handling equipment). Smaller containers such as 30-liter or 56-liter drums may be stacked on larger containers such as 208-liter drums without special equipment. Specialized equipment, which is not currently available at the 222-S TSD unit, is required for 208-liter drums stacked on 208-liter drums. This equipment may be purchased in the future and therefore DOE-ORP is requesting that the option to stack 208-liter drums be maintained.

4.2.2.5 Moving Containers out of the 222-S Dangerous and Mixed Waste Storage Area, Room 2-B, and/or Room 4-E Storage Areas to Transfer Vehicle

Personnel inspect the containers to ensure containers are labeled properly and are in sound condition before transfer from the 222-S TSD unit to another onsite TSD unit or offsite TSD facility. Containers are removed from the 222-S DMWSA, Room 2-B, and Room 4-E to the transfer vehicle via dolly, hand truck, cart, or other method determined to meet the requirements of WAC 173-303-630(5)(b). Containers removed from Rooms 2-B and Room 4-E exit the facility through door 10 or door 13 depending on radiological conditions and the need for overhead crane use. Containers removed from the DMWSA will use the loading deck located at the DMWSA. Waste transfer pathways are controlled by authorized personnel during movement of waste containers from the 222-S TSD components to the transport vehicle. Communications and access during waste transfers are controlled by 222-S TSD personnel. The containers are loaded onto the transfer vehicle, continuously maintained in an upright position, and are not stacked during transport. The total load weight is not allowed to exceed truck capacity. The containers are restrained during transport to minimize movement.

4.2.2.6 Transfer Documentation

Waste tracking documentation (i.e., container inventory, chemical data) is completed and accompanies a transfer of mixed or dangerous waste into and from the 222-S TSD components: 219-S Waste Handling Facility, 222-S DMWSA, Room 2-B, and Room 4-E to another onsite TSD unit. Waste movement and transfers are documented in the 222-S TSD unit operating record. Transfer of waste from the 222-S TSD unit to an onsite TSD unit will be documented in accordance with Hanford Facility RCRA Permit Condition II Q. Note that all pipeline transfers are exempted from meeting transfer documentation requirements per Permit Condition II.Q.

4.2.3 Labeling System [D-1c]

Each container is marked with a PIN that is used for tracking. For containers purchased from onsite stores, a barcode number is affixed prior to our receipt and serves as the PIN. Containers not purchased from onsite are assigned a PIN when the container is placed in use. A list of these PINs is maintained in the TSD unit operating record. The PINs are recorded on the container inspection checklist. A hazardous waste label is affixed. Each container is labeled with the appropriate major risk(s) such as 'corrosive,' 'toxic.' If a label is damaged or information is not legible, the old label is removed completely and a new label is affixed containing pertinent information from the old label. Inner containers may be added to partially filled outer containers. The container inventory will be updated when inner containers are added. Containers rendered empty in accordance with WAC 173-303-630(3) have labels removed or destroyed.

4.2.4 Containment Requirements for Storing Containers [D-1d]

The 222-S DMWSA *consists* of two enclosed *metal storage structures*. Room 2-B and Room 4-E are rooms within the 222-S Laboratory.

4.2.4.1 Secondary Containment System Design and Operation [D-1d(1)]

Within the two structures of the 222-S DMWSA are two storage cells separated by a center wall. Each storage cell is provided with its own secondary containment called a basin. The basins are located beneath the steel platform (floor grating) in the cell. Each basin is 3.4 meters by 4.6 meters by 0.15 meter (deep) and is constructed of 10-gauge carbon steel, which in turn is lined with a chemical resistant coating for resistance to acids, alkalies, solvents, and salts. Each basin is capable of containing approximately 2,300 liters for a 222-S DMWSA secondary containment total of approximately 9,200 liters. An engineering drawing (H-2-78364, sheet 7) of the storage area is provided in Appendix 4A.

In the event of a leak or spill occurring within a cell, the spilled waste would be contained in the respective basin or separate secondary containment. The basin is sealed to prevent liquids from migrating to the other basin in the structure. The leak or spilled waste would not come in contact with the other contained waste as the floor grating covering each basin only allows liquids to flow down into the basin. All leaked and/or spilled waste will be removed using sorbent pads or a portable pump, depending on the volume of the leak or spill. Spill material will be managed as waste and entered in the TSD operating record.

Waste containing free liquid or waste that exhibits either the characteristic of ignitability or reactivity stored in Room 2-B is placed on either spill pallets or other secondary containment devices [WAC 173-303_630(7)]. These pallets or containment devices are of suitable size to contain the volume of the largest container or 10 percent of the volume of all the containers whichever is greater.

Waste containing free liquid or waste that exhibits either the characteristic of ignitability or reactivity stored in Room 4-E is placed on either spill pallets or other secondary containment devices [WAC 173-303-630(7)]. These pallets or containment devices are of suitable size to contain the volume of the largest container or 10 percent of the volume of all the containers whichever is greater, except waste that does not contain free liquids or waste that is not ignitable or reactive. Waste that does not contain free liquids or is not ignitable or reactive will be placed on the floor because this waste is otherwise protected from contact with accumulated liquids.

4.2.4.1.1 System Design [D-1d(1)(a)]

Containment for the DMWSA consists of two structures that face one another and open onto a common loading platform (Appendix 4A). Each storage structure measures 9.8 meters long by 3.7 meters wide by 2.7 meters high. Each storage structure (Figure 4-5) is divided into two identical separate compartments or cells (a total of four cells). Each cell has a door that opens onto a loading platform that lies between the two storage structures. The loading platform is approximately 3 meters in width. The storage structures and loading platform are elevated approximately 50 centimeters above the existing grade. Inside the 222-S DMWSA, containers rest on a chemical resistant nonskid fiberglass grate above a steel secondary containment basin that is free of cracks and has a chemical resistant coating.

The loading platform, constructed between the two 222-S DMWSA structures, consists of steel grating that rests on a lattice of steel beams placed between the two structures. A protective fence is placed at the two open ends for operational safety. A 6-inch layer of concrete on a layer of asphalt is located below the steel grating to prevent the release of material to the environment in the event of a spill. Administrative controls include using equipment to prevent tipping during movement and using authorized, trained personnel. No heavy equipment, forklifts, etc., are allowed to operate on the loading platform or be used in the storage cells to move the waste containers. A lift located on the south end of the 222-S DMWSA is used to lift containers to the loading platform. On the opposite end (north) of the loading platform, containers can be raised manually or mechanically from the asphalt pad to the platform using a forklift. Once the waste containers are placed on the loading platform, the containers are moved in and out of the storage cells.

The containment basins are enclosed and protected from precipitation (Appendix 4A). Each storage structure has a roof that collects and sheds the precipitation to the rear of the building, away from the doorways and loading platforms. No gutters and/or downspouts are included in the design because of the low annual rainfall (approximately 15 centimeters per year). To prevent any standing water from accumulating beneath the 222-S-DMWSA, the surrounding grade is sloped. See Section 4.2.4.1.4 and Section 6.4.2 for more detail on 'run-on' and 'run-off' management.

4.2.4.1.2 Structural Integrity of Base [D-1d(1)(b)]

The 222-S DMWSA structures rest on a system of footings and are elevated above a concrete pad at the north side of the 222-S Laboratory (Appendix 4A). The flooring for the structure is formed by placing (in parallel) a set of structural steel I beams that span the entire length of each storage structure (approximately 9.8 meters). A channel was welded to the ends of the I beams to form a closed cell. The structures are supported at each corner and are coupled to the concrete slab using approved seismic constraints.

The sump or secondary containment rests on top of the I beams. The grate that forms the flooring in each cell rests on a set of cross channels that in turn rest on the bottom of the sump. The set of cross channels is oriented perpendicular to the set of structural steel I beams. The floor and sump were constructed to support the weight of the containers or leaked liquids respectively.

The 222-S DMWSA structures were designed, fabricated, and installed in accordance with the requirements of WAC-173-303-630 and the 1997 Uniform Building Code.

4.2.4.1.3 Containment System Capacity [D-1d(1)(c)]

The volume of the containment system is required to be 10 percent of the volume of all containers stored within the system or the volume of the largest container whichever is greater. As calculated in Section 4.2.4.1, the DMWSA containment storage provided by each sump is approximately 2,300 liters. Based on these calculations and the physical limitation of the storage cell, secondary containment exceeds the 10 percent requirement.

Because the 222-S DMWSA is a covered storage area, precipitation is prevented from entering the structures and therefore is not included in these calculations. Furthermore, because dry chemicals are used for fire control, no adjustment for use of an automatic sprinkling system (20 minutes of fire water) is necessary in the containment system capacity calculations.

4.2.4.1.4 Control of Run-On [D-1d(1)(d)]

The only plausible major run-on events could result from either a thunderstorm or a water main break. No floods are predicted to affect the 222-S TSD because the 200 West Area on the Hanford Site is approximately 100 meters above the Columbia River floodplain.

The threat to the DMWSA TSD from run-on resulting from either a thunderstorm or water main break is considered highly unlikely because the DMWSA is elevated above ground level, the area is graded to slope away from the DMWSA, and a catch basin, located to the north, is provided at the low point of the grading. The DMWSA components were fabricated with extended feet, which are mounted to the south on the concrete slab and on elevated concrete footings to the north. The concrete slab is higher than the adjoining pavement and slopes to the north, to the catch basin. With the elevated feet and concrete footings, the 222-S DMWSA is elevated approximately 48 centimeters above the surrounding grade and 25 centimeters above the concrete pad on which the structures rest.

Room 2-B storage area and Room 4-E are located inside the 222-S Laboratory. As a result, no flooding and/or run-on, resulting from either a water main break or thunderstorm, is included in the design.

4.2.4.2 Removal of Liquids from Containment System [D-1d(2)]

The equipment used for removal of large quantities of liquid spilled in the containment sumps is a hand-held pump or vacuum truck. Sorbents are used for removal of small quantities of liquid. In the event of a spill, a recovery plan will be developed, as necessary, based on input from the building emergency director and environmental management. The spilled material will be removed from the containment system in as timely a manner as necessary to prevent overflow [WAC 173-303-630(7)] and harm to human health and the environment. If the spilled material is unidentified, sampling would be performed and the waste material stored in container(s) at the 222-S DMWSA until analytical results were received. The same procedure would be used to remove liquid from the containment basins in the 222-S DMWSA and from spill pallets and portable containment in Room 2-B and Room 4-E.

4.2.5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes in Containers [D-1f]

A general description of the management of dangerous waste storage containers in the 222-S DMWSA is provided in Section 4.2.2.4. Incompatible waste is stored in separate containers. Figures 4-1, 4-2, and 4-3 show a typical layout of container storage in each of the storage units. The following sections provide information on the management of reactive, ignitable, and incompatible waste in containers. The 222-S DMWSA has a pre-engineered dry chemical fire protection system designed to protect both compartments. The suppression system is activated by an Underwriters Laboratory-listed fusible link detection system.

The fire protection system used in Room 2-B and Room 4-E consists of heat-activated ceiling sprinklers, smoke detectors, and alarms. Each ceiling sprinkler system is heat activated. Smoke detectors are located in the ceiling panels and are connected to the fire alarms. The heat-activated sprinklers also activate the fire alarms that are monitored around-the-clock by the Hanford Fire Department.

4.2.5.1 Management of Ignitable and Reactive Waste in Containers [D-1f(2)]

The 222-S Laboratory operations generate ignitable waste that is managed in accordance with WAC 173-303-630(8)(b). Separate labpack containers are used, and other waste types are not packed with ignitable waste. Incompatible ignitable waste is separated from containers of other waste types in the 222-S DMWSA, Room 2-B, and Room 4-E. Within Room 2-B and Room 4-E, ignitable waste is placed on a separate secondary containment.

Reactive cyanide- and sulfide-bearing waste could be generated occasionally at the 222-S Laboratory. Incompatible reactive waste is placed in separate overpack containers and no other waste is packed with reactive waste. Reactive waste stored in the 222-S DMWSA is placed over a separate collection basin of the containment system. Within Room 2-B and Room 4-E, reactive waste is placed on a separate secondary containment. Within the 222-S DMWSA, reactive waste is segregated by placing waste in separate containers.

Ignitable and reactive waste is stored in accordance with NFPA 30 for emergency egress and WAC 173-303-630(8).

4.2.5.2 Design of Areas to Manage Incompatible Waste [D-1f(3)]

No incompatible waste is packed in the same container. Containers of incompatible waste are separated in the 222-S DMWSA in accordance with WAC 173-303-630(9)(c). Personnel inspect the containers for proper packaging, labeling, marking, and waste tracking forms before transport. Within Room 2-B and Room 4-E, incompatible waste is placed on a separate secondary containment.

4.3 219-S TANK SYSTEM [D-2]

This section describes the design and operation of the 219-S Tank System for treatment and storage of mixed waste. Major topics discussed in this section include the following:

- Design, installation, and assessment of tanks and ancillary equipment
- Secondary containment system including leak detection
- Tank corrosion and erosion prevention
- Tank management practices
- Ventilation system to control air emissions.

This section describes the current equipment and the upgrades to the 219-S Tank System. A general description of the 219-S Tank System is included in Chapter 2.0. The waste handling and transfer system is shown in Figure 4-4.

The piping from the 222-S Laboratory, as part of the 219-S Tank System, originates in several locations throughout the building as shown in Figure 4-5. The lines are encased for secondary containment from the point of origin at the laboratory locations to the secondary containment for the waste tanks in compliance with WAC-173-303-640(4). These lines originate at the following locations:

- Room 2-B, hood 16 sink drain pipes
- Room 1-J, north inductively coupled plasma (ICP) spectrometer drain line
- Room 1-J, south ICP spectrometer drain line
- Room 1-K, capped drain line
- Room 1-F, hot cell 1F, floorpan sink drain line pipe
- Room 1-A, hot cell 1A, floorpan sink drain line pipe
- Room 1-E, hot cell 1E-1, floorpan sink drain line pipe
- Room 1-E, hot cell 1E-2, floorpan sink drain line pipe
- Tunnel T-4, T-4 sump pump
- Tunnel T-7, T-7 sump pump
- Tunnel T-8, T-8 sump pump
- Room 11A, hot cells 11A1A, 11A1B, 11A2, 11A3, 11A4, 11A5, and 11A6 floorpan sink drain line pipes (two each).

Liquid wastes from the above points of origin flow through two drain lines to terminate in tank 104, except the two drain lines (DR-1 and DR-2) from Room 11A that terminate in tank 101 (Section 4.3.4.6).

The boundary to the 219-S Tank System within the Room 2-B storage area is the hood 16 sink drain pipe connection to the hood sink. Hood 16 and associated sinks are used for mixed waste transfers to the 219-S Tank System and decontamination of sampling and sample transport equipment. This drain line is used to transfer liquid waste consisting of unused sample portions, unused sample dilutions, expired reagents, analytical waste from sample analysis or treatability testing, standards materials, decontamination reagents, and other wastes that have been approved as meeting the 219-S Tank System acceptance criteria. This hood is equipped with a water source that is normally used to flush the transfer lines and sinks after material is transferred.

The boundary for the 219-S Tank System in Room 1-J is the piping connection to each of the two hood sink drains for the north and south ICP spectrometer units. These ICP spectrometers are used to analyze samples, and part of the unused sample portions that are not used during the analysis are transferred into these drains. These hoods are equipped with a water source that is normally used to flush the transfer lines after material is transferred.

The drain line in Room 1-K is capped above the room floor level and nothing is currently connected to this entry point.

The connection of the drain line to each of the hot cell floorpan sinks is the boundary for the 219-S Tank System. The hot cell floorpan sink drains lines from all hot cells (1-A, 1E-1, 1E-2, 1-F, 11A1A, 11A1B, 11A2, 11A3, 11A4, 11A5, and 11A6) and are used for transfer of liquid waste. This waste consists of unused sample portions, unused sample dilutions, expired reagents, standards materials, decontamination reagents, wastes used for analysis and testing, and other wastes that have been pre-approved as meeting the 219-S Tank System acceptance criteria. These hot cells are equipped with a water source that is normally used to flush the transfer lines after material is transferred.

The boundary of the 219-S TSD component with the T4, T7, and T8 sump drain lines is the point of connection for the discharge of the sump pump to the double-encased drain line. These sumps are normally only used for emergency purposes in the event that a process water line in one of the tunnels starts leaking. They may also be used for a water spray wash of tunnel areas for cleaning purposes.

Piping associated with the tank system in the concrete vault area is not encased when located in or above a RCRA compliant vault [WAC 173-303-640(4)(e)(ii)]. The secondary containment in the vault area provides the secondary containment for this piping. The two piping lines for transfer to tank farms are encased for secondary containment because they traverse the unlined vault that is not RCRA compliant.

4.3.1 Design, Installation, and Assessment of Tank System [D-2a]

The 219-S Waste Handling Facility TSD component was constructed in 1951 with the footprint that currently matches the area designated as part of the 219-S Tank System. The 219-S Tank System includes tank 101, tank 102, tank 103, tank 104, ancillary piping and equipment (see Table 4-1), and vault area which includes cells A and B (Figure 4-5). Tank 103 is no longer part of the active 219-S Tank System (Section 4.3.1.1.2). The 219-S Waste Handling Facility also includes the operating gallery and sample gallery. The 219-S operating gallery contains a below-grade pipe trench which permits piping and electrical connections to the vault area. The operating area of the operating gallery is a slab-on-grade metal-framed structure with transite siding. The sample gallery is a slab-on-grade concrete floor and wall structure. The 219-S vault area is a below-grade concrete structure with a minimum wall and floor thickness of 0.46 meters. Cell A in the vault area is approximately 3.66 meters wide by 6.40 meters long by 6.40 meters deep. Cell A contains tank 101 and tank 102. Cell B is subdivided in two compartments that are approximately 2.13 meters wide by 2.13 meters long by 6.40 meters deep. The northern compartment in cell B contains tank 103. In 1994, an upgrade to the facility included the addition of stainless-steel liners in the vault cell A and the southern compartment of cell B, addition of tank 104 in the southern compartment of cell B, and upgrades to the ancillary piping and equipment. The upgrade also added a planning room, change room, and buffer area room to the facility, which are not classified as part of the 222-S TSD.

The tanks are located in a below-grade concrete vault. Two stainless-steel liners have been inserted in the concrete vault to provide secondary containment. Liquid mixed waste flows by gravity from the 222-S Laboratory through a system of double-walled pipelines to the tanks located in the 219-S Tank System.

4.3.1.1 Design Requirements [D-2a(1)]

The concrete vault area, operating gallery, and sample gallery of the 219-S Tank System were constructed in 1951 in accordance with the 1949 edition of the Uniform Building Code. Completed in 1999, the 219-S Tank System was upgraded using the 1994 Uniform Building Code and WAC 173-303-640 to include the following:

- Double containment pipelines from several locations, as identified in Section 4.1.2, within the 222-S Laboratory to the 219-S Tank System

- An integrity assessment of the existing tanks (tanks 101 and tank 102) as provided in Appendix 4B-1 and a design, installation, and inspection of a new tank (tank 104) as provided in Appendix 4B-2

- Placement of a stainless-steel liner in each of the two cells in the concrete vault that house the storage and treatment tanks (tanks 101, 102, and 104)

- Installation of new ancillary equipment including pumps, leak detection, liquid level instrumentation, and cell piping.

- Completion of design, construction, and installation inspections.

4.3.1.1.1 Description of Ancillary Equipment

A total of six waste transfer pipelines connect the 222-S Laboratory to the 219-S Waste Handling Facility. Four of these pipelines currently are operational and two are spare lines. These pipelines are encased to meet secondary containment requirements [WAC 173-303-640(4)] and originate from various locations within the 222-S Laboratory. One of the operational pipelines (WT-5702) originates from equipment in Rooms 2-B, 1-J, 1-K, and hot tunnel sump T-4, with one of the spare lines (WT-5701) running parallel from inside tunnel T4 to inside 219-S cell B. Another operational pipeline (WT-5704) originates from hot cells 1-A, 1-E1, 1-E2, 1-F, and hot tunnel sumps T7 and T8, with the other spare line (WT-5703) running parallel from inside tunnel T8 to inside 219-S cell B. The other two operational pipelines (DR-1 and DR-2) are from the 11A hot cells. A description of the four pipelines is provided in Appendix 4B-2. Figures 4-4 and 4-5 show the piping layouts and connections of these lines to the various points of discharge from the 222-S Laboratory.

The pipelines have been pressure tested (Appendix 4B-3). In addition, pipelines are supported and restrained from movement in tunnels T-4, T-7, and T-8. Drains for liquid waste that flow from the hood 16 sinks, ICP spectrometers, and hot cells in Rooms 1-A, 1-E, 1-F, and 11A are encased in double-walled piping. The pipelines from the 222-S Laboratory to the 219-S Waste Handling Facility are installed below grade and are designed to transfer waste using gravity flow. The minimum slope is 1.87 percent to facilitate flow. The pipelines are an encased double-containment design consisting nominally of a 2-inch pipe inside a 4-inch pipe, although a 1-inch pipe encased in a 2-inch pipe was used for some of the hookups. The smaller pipe carries the waste and the larger pipe provides the secondary containment. Both the primary and secondary pipes are fabricated from Schedule 40 304L stainless steel. The selection of stainless steel was based on the characteristics and temperature of the waste. A discussion of the design specifications and engineering assessment to allow design certification is provided in Appendixes 4B-1, 4B-2, 4B-3, and 4B-4. Included in these appendixes is the inspection and/or construction "as-built" certification that ensures the new underground waste transfer pipeline was constructed in accordance with the design.

During the process of upgrading the piping network in 1994, a quantity of highly radioactive pipe was removed from tunnel T8. Because of the health risk associated with extended exposure to this pipe, a proposal was made to Ecology to cut the pipe and place the piping in a shielded staging area within tunnel T-8. Ecology approval was received on October 10, 1997 (99-EAP-446). The radioactively contaminated pipe will be removed during closure of the 222-S TSD unit.

Leak detection probes for active drain lines are located in the annulus of the piping. The Room 11A lines (DR-1 and DR-2) have single leak detector locations (LDE-1 and LDE-2, respectively) because the lines are buried directly under the hot cells. The drain lines from T-4 (WT-5702) and from T-8 (WT-5704) have leak detectors (LDE-5 and LDE-6, respectively) that are located on the collection header inside the 222-S Laboratory tunnels where the pipe exits the building. The downgradient leak detector locations (LDE-3 and LDE-4) for WT-5702 and WT-5704, respectively, are located just outside of the concrete vaults where the waste enters the 219-S Tank System. The leak detection probes are connected to remote alarm panels located in both the 219-S Tank System operating galley (instrument panel IP3) and in Room 3-B inside the 222-S Laboratory.

Inside the 219-S TSD component vault area, air-operated transfer pumps and associated piping are used to move liquid waste from tank 101 (Pump-4) and tank 104 (Pump-2) to tank 102, from tank 102 (Pump-1) to DST System tank 241-SY-101 (WT-SNL-5350) or 241-SY-103 (WT-SNL-5351), sump 7 (Pump-7) to tank 101, and sump 9 (Pump-9) to tank 104. Liquid from sump 6 (Pump-6), which is not part of the secondary containment or tank system, is transferred in tank 104.

Leak detection probes (LTE-7 and LTE-9) are installed in sumps 7 and 9, respectively, within the vault to provide notification of potential leaks in the tanks or water intrusion. The leak detection probes are connected to remote alarm panels located in both the 219-S operating galley (instrument panel IP3) and in Room 3-B inside the 222-S Laboratory.

Liquid level indicators are installed on tanks 101, 102, and 104. The level indicator readings are transmitted to the 219-S operating gallery chart recorders (instrument panel IP3) which are equipped with alarm setpoint adjustment capabilities. The alarm setpoints for the waste tanks liquid level indicators are set below the tank maximum operating capacity and alarm locally within the 219-S operating gallery and in Room 3-B inside the 222-S Laboratory. Normal operation of the tank system is below the alarm setpoints to prevent overfilling of the tanks.

Within the 219-S vault area is a pipeline from the discharge of pump P1 to the connection to the DST System pipelines at the outside of the west wall of the cell B vault area. This pipeline includes a surge suppressor (WT-ARSR-1), a manual valve (219S-WT-V-5351), two motor-operated valves (219S-WT-5354 and 219S-WT-V-5355), and encased piping beginning downstream of the motor-operated valves to provide secondary containment to transverse over the tank 103 portion of cell B. The manual valve (normally open) is used to provide additional isolation of the transfer line for maintenance work associated with the pump and piping system. The motor-operated valves (normally closed) are used to direct a waste transfer to either 241-SY-101 or 241-SY-103 in the DST System and are controlled with key switches in the 219-S operating gallery with only one opened during a waste transfer to the DST System.

Valves associated with the 219-S Tank System are provided for routing or isolation of various components. There are manual valves (LD-1, LD-2, WT-LD-V-3, WT-LD-V-4, WT-LD-V-5, and WT-LD-V-6) installed on each of the drain line leak detectors (LDE-1, LDE-2, LDE-3, LDE-4, LDE-5, and LDE-6, respectively), which are maintained in the closed position and are used for draining the leak detectors. There are two manual valves on the transfer line from the pump line from tank 104 which can be configured to pump to tank 101 (WT-V-T10) (normally closed) or tank 102 (WT-V-T11) (normally open). The tank 104 to tank 101 valve is provided to allow waste transfer to tank 101 if both tanks 102 and 104 are full. In addition, there is one manual valve and three motor-operated valves in the vault associated with the waste transfer line to the DST System. The other motor-operated valve (219S-HV-305) (normally open) is located on the top of the transfer line to allow the transfer line to drain after completion of a waste transfer to the DST System. This motor-operated valve is only closed during the pumping of tank 102 to the DST System.

The 219-S operating gallery contains the 2,650-liter tank 201, which is used for the product addition of sodium hydroxide, a 208-liter drum for dissolving sodium nitrite, raw water service, and associated valves and piping to tank 102 for treatment and flushing. Tank 201 is used for product addition only and does not treat, store, or dispose of dangerous/mixed waste and therefore is not part of the 219-S TSD component.

Ancillary equipment is equipped with secondary containment or is inspected daily with the exception of those portions noted in Section 4.3.3. Table 4-1 provides a listing of ancillary equipment. Chapter 6.0, Table 6-1, identifies the inspection requirements.

4.3.1.1.2 Description of Tanks

Tank 101 is a flat-bottomed steel tank, 2.74 meters in diameter by 2.74 meters tall. The tank is constructed of 1.27-centimeter-thick niobium-stabilized type 347 stainless steel. The tank was fabricated in 1943 and was not used until installation into the 219-S Tank System in 1951. Tank 101 has an approximate volume and maximum operating capacity of 15,140 liters. The maximum operating capacity limits are established to remain within the design capabilities of the liquid-level monitoring system and prevent overflows. The tank is equipped with a liquid-level monitoring system, temperature indication, and an agitator. Tank 101 is contained in cell A of the vault.

Tank 102 was also fabricated in 1943 and is the same design, size, and volume as tank 101. Tank 102 is contained in cell A of the vault with tank 101. The approximate volume and maximum operating capacity of tank 102 is approximately 15,140 liters. The maximum operating limits are established to remain within the design capabilities of the liquid-level monitoring system and prevent overflows. The tank also is equipped with a liquid-level monitoring system, temperature indication, and an agitator. In addition, tank 102 is equipped with a sampling system because it is the primary tank for treatment of the liquid waste prior to transfer to the DST System.

Tank 104 was fabricated in 1995 and is 1.83 meters in diameter by 3.05 meters tall. The tank is constructed from 0.79-centimeter-thick 304L stainless steel with a total volume and maximum operating capacity of approximately 7,192 liters. The maximum operating limits are established to remain within the design capabilities of the liquid-level monitoring system and prevent overflows. This tank is equipped with a liquid-level measuring system, temperature indication, and an agitator. Tank 104 is located in the southern chamber of cell B of the vault.

Tank 103 was placed in service in 1951 in the northern chamber of cell B and used for collection of hot cell waste until 1994. During the upgrade to the facility for secondary containment, it was determined that because of the physical configuration of the tank and attachments, it was not feasible to remove the tank 103, upgrade the containment, install seismic constraints, and perform an integrity assessment. Tank 103 was pumped, triple rinsed, disconnected, blanked, and taken out of service (Figure 4-4). A partial closure was not performed on tank103 because it is more cost effective to delay closure of this tank to align with closure of other tanks within the 219-S Tank System. Since tank 103 was emptied of waste and isolated, the threat to workers and the environment is minimal (refer to Chapter 11.0).

4.3.1.1.3 Description of Sampling System

A portion of the 219-S Tank System not requiring a double-containment pipe is the tank 102 sampling system. The sampling system does not meet the definition of ancillary equipment (WAC 173-303-040). The sampling system is used to collect samples from tank 102 through the use of a vacuum. The balance of the waste is returned to the tank once the sample has been collected in the sample box located in the 219-S Tank System sample gallery room. Any leakage inside the sampling gallery can be seen.

4.3.1.1.4 Description of Tank Ventilation System

The headspace above the liquid mixed waste in tanks 101, 102, and 104 is ventilated to atmosphere through the demister in tank 105, a high-efficiency particulate air (HEPA) filter, exhaust fan, and up the 296-S-16 exhaust stack. The demister in tank 105 is a fiberglass mesh which serves as a moisture de-entrainer to condense some of the humidity, which forms in the air in the tank headspace. The removal of the moisture reduces the wetting of the HEPA filter. The HEPA filter removes any particulates that may be exhausted up the ventilation system prior to release out of the stack. The stack is sampled and the system is maintained in accordance with the Hanford Site Air Operating Permit approved by the Washington State Department of Health (WDOH).

4.3.1.2 Integrity Assessments [D-2a(2)]

An initial design integrity assessment of the 219-S Tank System was performed in 1990 (WHC-SD-CP-ER-030). This assessment included a structural analysis on tanks 101 and 102, which demonstrated that under normal operating conditions the required minimum wall thickness is 0.157 centimeter.

With the completion of tank system upgrades at the 219-S Tank System, a subsequent series of assessments were completed.

The current 219-S Tank System assessment reports address existing tank system components [WAC 173-303-640(2)] and new tank system components [WAC 173-303-640(3)]. The report for each design and/or installation assessment is provided in Appendixes 4B-1 through 4B-4. These assessments refer to the 219-S Tank System as (1) the collection system, (2) the transfer system from the 222-S to 219-S Tank System, and (3) the storage and treatment system, or similar terms. The design assessment reports attest to the integrity of the tank system as being designed adequately and having sufficient structural strength and compatibility with the waste to be stored and treated to ensure that the tank system will not collapse, rupture, or fail. The installation assessment reports ensure that proper handling procedures were adhered to during installation. The assessment reports are as follows:

- Appendix 4B-1: Existing components, tanks 101 and 102

- Appendix 4B-2: New components, tank 104 and vault ancillary equipment (Project W-178)

- Appendix 4B-3: New components, 222-S Laboratory to 219-S Tank System ancillary equipment (Project W-087 Phase II)

  Note: Project W-087 Phase I upgraded ancillary equipment included in the DST System TSD unit boundary and is referred to as the transfer system from the 219-S Tank System to the 244-S Receiving Tank

- Appendix 4B-4: New components, 222-S Laboratory to 219-S Tank System ancillary equipment (Project W-041H).

The development of a schedule for future evaluations, as required by WAC 173-303-640(2)(e) and WAC 173-303-640(3)(b), is addressed in Sections 4.3.1.3 and 4.3.1.4.

4.3.1.3 Additional Requirements for Existing Tanks [D-2a(3)]

As discussed in Appendix 4B-1, both visual and ultrasonic tests were performed on tanks 101 and 102. The wall thickness was measured to be nominally 1.27 centimeters, indicating that the tanks have not experienced any measurable deterioration over 40 years of operation. Based on this information, released in 1999, the tanks were determined to be fit for use with a 20-year interval to the next required integrity assessment. The components of the 219-S Tank System will be reevaluated in 2019, 20 years from the release of the current tank integrity assessment.

4.3.1.4 Additional Requirements for New Tanks [D-2a(4)]

The installation and inspection of tank 104 was certified by an independent, qualified, registered professional engineer. A copy of the document that provides this assurance, design, design acceptance, and installation is provided in Appendix 4B-2. Based on this information, no reduction in tank wall thickness is anticipated over the planned 20-year interval to the next required integrity assessment. As a result, the components of the 219-S Tank System will be reevaluated in 20 years (2019).

4.3.2 Secondary Containment Requirements and Release Detection for Tank Systems [D-2b]

This section presents a discussion on containment system design and capacity, control of run-on, and the leak detection system. The secondary containment system consists of structures, equipment, and operating methods designed to prevent the release of mixed waste to the environment. As discussed in this section, the mixed waste treatment and storage tanks are located in a below-grade concrete vault. In addition, leak detection and overfill equipment are fitted in the tanks and vault.

4.3.2.1 Requirements for All Tank Systems [D-2b(1)]

Tanks 101, 102, 103, and 104 are contained in a below-grade concrete vault. The vault is divided into two cells, A and B. Tanks 101 and 102 are contained in cell A, and tanks 103 and 104 are contained in cell B. Cell B is divided into two chambers: one chamber containing tank 103 and the other chamber containing tank 104. Tank 103 has been pumped, triple-rinsed, and isolated (Section 4.3.1.1.2) and is not included as part of the operational aspects of this permit application. Tank 103 will be closed as part of the 219-S Tank System closure (Chapter 11.0).

The concrete vault was constructed in 1951. The vault floor varies from 0.4 to 0.7 meter in thickness. The vault wall varies from 0.5 to 1.1 meters thick. The vault is approximately 6.4 meters deep and was divided into two cell areas, A and B. Cell A is approximately 3.61 meters wide by 6.34 meters long, and cell B is approximately 2.08 meters wide by 5.64 meters long. Cell B is further divided into two chambers, northern and southern, separated by a 1.1-meters-thick by 3.4-meters-high wall. Tank 101 and tank 102 were placed in cell A, and tank 103 was placed in the northern chamber of cell B. At the time of construction until the time of upgrade in 1994, the southern chamber of cell B was vacant.

In 1999 stainless-steel liners were installed in cell A and the southern chamber in cell B containing tank 104. The stainless-steel liners are designed to contain approximately 125 percent of the total tank volumes in each cell.

In cell A, the nominal size of the liner is 3.61 meters by 6.34 meters by 1.625 meters (averaged). The liner is fabricated from stainless steel with walls 0.95-centimeter thick and the floor 1.27-centimeters thick. An average height is used as the cell is sloped approximately 20 centimeters from south to north towards the sump in the northwest corner. A cubical-shaped sump (sump 7) is located in the northwest corner of cell A. Grout has been placed between the liner and the existing concrete vault to form a stable foundation for the tanks. Appendix 4A contains the plan and elevation views of cell A as currently configured.

In the southern chamber in cell B, the nominal size of the liner is 2.09 meters by 2.09 meters by 2.09 meters in height. The liner is fabricated from stainless steel with sidewall and bottom thickness the same as the liner in cell A. The liner is sloped 4 centimeters from back to front. Sump 9 is located in the southwest corner of cell B. As discussed with cell A, grout has been installed between the liner and the existing concrete vault. Appendix 4A contains the features of the containment liner installed in cell B.

In addition to the secondary containment system, a process control system is in place to detect leaks from the tank system. All tanks and the 219-S Tank System sumps have level probes, are lighted, and have audible alarms to indicate when the liquid level limit is exceeded. An alarm sounds when the liquid level setpoint in a tank is exceeded or when enough liquid accumulates in a sump to exceed the liquid level setpoint. Operational test records are maintained in the 222-S Laboratory Complex operating record.

The hot tunnel sumps are located in the hot tunnels T-4, T-7, and T-8 of the 222-S Laboratory. These sumps will collect water leaking from ruptured process water piping that runs through each of the tunnels. Each of these sumps is poured into the concrete floor of the hot tunnels and has approximately a 68-liter capacity. The sumps are equipped with an electrical powered sump pump with a float switch set to automatically turn the pump on before the sump is full which pumps the liquid waste into the 219-S Tank System. When a sump pump float switch is engaged, an alarm is received in Room S3-D and Room 3-B. The 219-S Tank System begins at the point that the pump line discharges into the 219-S Tank System piping. The 219-S Tank System piping in the hot tunnels is encased to provide secondary containment so the hot tunnels, including these sumps and pumps, are not deemed as secondary containment or ancillary equipment for the 219-S Tank System.

Alarms for the tanks and the 219-S Tank System sumps are located in Room 3-B of the 222-S Laboratory and in the 219-S Tank System operating gallery. The 222-S Laboratory is operated to ensure any alarm will be observed and responded to within 24 hours. The leak detection system and associated pumps allow for detection and removal of any accumulated waste within 24 hours. In the event detection and removal cannot be accomplished within 24 hours, a demonstration according to WAC 173-303-640(4)(c) will be made to Ecology as appropriate. The leak detection activation level is consistent with the residual sump volume discussions and agreement reached on December 18, 1997 (meeting minutes "222-S Laboratory Secondary Containment Upgrades - Project W-087/W-178 Status and Issue Clarification"). A copy of these minutes is retained in the unit operating record.

4.3.2.2 Secondary Containment Volume

The volume of the secondary containment provided by the stainless-steel liners in cell B is calculated to be approximately 2.09 meters by 2.09 meters by 2.09 meters by 1,000 liters/cubic meters = 9,130 liters based on the size of the liner. The approximate total volume of tank 104 is calculated to be 7,192 liters. Similarly, the volume of the secondary containment provided by the stainless-steel liner in cell A is calculated to be approximately 3.61 meters by 6.34 meters by 1.625 meters by 1,000 liters/cubic meters = 37,192 liters. The approximate combined total volume of tanks 101 and 102 is 30,280 liters. Leak detection instrumentation has been placed in both cell A and cell B. The leak detection is designed to detect any liquid that collects in the sumps. Pumps have been installed in both cells to remove liquid that accumulates in the sumps. The locations of the leak detection and pumps installed in cells A and B are shown in Appendix 4A.

4.3.2.3 Run-on

Run-on of precipitation into the 219-S Waste Handling Facility vault is controlled. The vault area is enclosed under a metal-sided building with removable roof sections. There are no fire suppression systems contained in this structure, and the process water to the tanks in the vault is controlled with valves in the 219-S operating gallery. The concrete walls of the vault extend approximately 15 centimeters above the exterior grading around the facility. The grading is sloped to a catch basin located to the southeast of the vaults. Any precipitation that may enter the vault is collected in either sump 9 in cell B or sump 7 in cell A. When the liquid level in the sump reaches the setpoint, an alarm sounds and supervision immediately is notified of the situation. Any moisture collected in the sumps is pumped to the waste tanks according to specified operating methods and in accordance with WAC 173-303-640(7).

A temporary portable berm or secondary containment may also be used to control run-on at the 219-S Waste Handling Facility during the pump out to a tanker truck or other containers. A temporary berm will only be utilized when use of a spill pallet or sump is not possible or feasible.

4.3.3 Variances from Secondary Containment Requirements [D-2c]

Variance from the need for secondary containment was requested and approved by Ecology for the following two conditions:

- A request for a waiver from secondary containment on a 2-1/2 inch-long vertical section of pipeline that penetrates the floor of Room 1-J was granted by Ecology (99-EAP-446). The section of pipe connects the ICP emissions spectrometer located in Room 1-J to the pipeline in tunnel T-4. This pipeline is equipped with secondary containment downstream of the section of pipe that penetrates the floor. Upstream from the floor, the pipeline can be inspected. The cost associated with relocating the equipment and chipping out the concrete for the anticipated small flow was not considered cost effective. The waiver is subject to change based on future use of the spectrometer and/or technological advancement. A description of the installation is provided in Appendix 4B-3.

- A drain header exists in tunnel T-8 that consists of a valve and a small section of pipe (approximately 2 inches in length). The drain header allows for cleanout of the line in the event that solid material settles out in the line. Although the header does fit the functional definition of ancillary equipment, agreement has been reached that secondary containment is not required because the drain header does not operate under pressure (99-EAP-446). The drain header is sloped upgradient of the direction of flow and therefore under normal operating conditions has limited contact with the liquid waste.

4.3.4 Tank Management Practices [D-2d]

The liquid radiological and mixed waste treated and stored at the 219-S Tank System is corrosive and contains metals and very low concentrations of some organic compounds. No separable-phase organic liquids are allowed in the liquid waste sent to the 219-S Tank System. Liquid mixed waste normally is routed to specific tanks based on configuration controlled piping and jumper configurations. Liquid mixed waste from Room 2-B hood 16; Room 1-J ICP spectrometers; and hot cells 1-A, 1E-1, 1E-2, and 1-F are routed to tank 104. Liquid mixed waste from the 11A hot cells is routed to tank 101. Liquid radiological and mixed waste in tanks 101 and 104 is transferred to tank 102 for treatment. Routing of waste to tanks other than normal configuration could occur, with configuration controlled design changes, in instances where a tank becomes temporarily unusable for the specified purpose. These temporary configuration changes would be considered major modifications and would require additional integrity assessments pursuant to WAC 173-303-640(2).

Before the waste can be transferred to the DST System, the pH and the nitrite concentration must meet DST waste acceptance criteria. The pH and nitrite conditions specified the DST waste acceptance criteria, slow the rate of corrosion in the DST System. The treatment of the mixed waste for pH and nitrite concentration also reduces the potential for tank 102 corrosion while stored in the 219-S Tank System awaiting transfer to the DST System. A discussion of the annual volume and waste characteristics treated and stored in the 219-S Tank System is provided in Chapters 1.0 and 3.0, respectively.

Various methods are used to limit the types of solutions routed to the 219-S Tank System. All waste that is transferred to the 219-S Tank System has been reviewed and approved. Waste from standard analytical methods is evaluated as part of the method development process and may be approved based on the waste generated for that method. Other mixed wastes, such as standards, reagents, maintenance waste, etc., may be approved and placed on a list for approved wastes or reviewed on a case-by-case basis for approval to transfer. Operating specifications are in place to maintain concentrations of chemical species within established limits for waste routed to the DST System.

Waste transfer methods are designed to prevent spills and overflows, prevent misrouting of waste, monitor the waste, ensure the safety of operating personnel, and provide records of activities at the 219-S Tank System. Controls to prevent overfilling of tanks include instrumentation within the tanks and operating guidelines to monitor the amount of waste in the tanks to ensure the tanks remain below maximum operating capacity to maintain a margin of safety. Liquid level indicators are installed on all three operating tanks in the 219-S Tank System, which have high-level alarms that are set below the tank maximum operating capacities and annunciate in the 219-S operating gallery and in Room 3-B of the 222-S Laboratory. In addition to alarms, periodic surveillances are performed and tank liquid levels are recorded. Sump 7 in cell A and sump 9 in cell B are also equipped with liquid level alarms that alarm at three different levels to provide an indication of liquid in the sumps and rate of rise. The sump alarms also alarm in the 219-S operating gallery and in Room 3-B.

Prior to transfer to the DST system, waste batches are transferred from tank 101 and/or tank 104 to tank 102. The contents of tank 101 can be blended with the contents of tank 104 in tank 102. Treatment with sodium hydroxide and sodium nitrite occurs in tank 102 before the transfer of the tank 102 contents to the DST System. In the event 219-S Tank System mixed waste does not meet the DST System waste acceptance criteria and will not be transferred to the DST System, these treatment steps might not be required to meet waste acceptance criteria for a different onsite TSD unit or offsite TSD facility. Waste treatment such as described would only be done to meet waste acceptance criteria for a downstream TSD. The treated waste is sampled and analyzed for receiving unit waste acceptance parameters identified in the waste analysis plan (Appendix 3A). Treatment of the waste may occur in tank 101 or 104 with the transfer of caustic and/or sodium nitrite to the tanks utilizing the drain lines in lab Room 2-B hood 16, or hot cells.

4.3.4.1 Tank 101

Waste routed to tank 101 is normally generated in the 11A hot cells. If tank 102 is full, waste from tank 104 may also be routed to tank 101. The contents of tank 101 typically are transferred to tank 102 for treatment; however, treatment may occur at tank 101. Treatment of the waste in tank 101 is a best management practice intended to extend the life of the tank beyond the predicted design life by reducing the corrosion caused by some of the acids in the tank. Tank 101 is equipped with an agitator, liquid level indication, and temperature indication.

4.3.4.2 Tank 104

Tank 104 receives liquid mixed waste generated during 222-S Laboratory operations. Wastes transferred to tank 104 originate from Room 2-B hood 16; Room 1-J ICP spectrometers; hot cells 1-A, 1E-1, 1E-2, and 1-F; and hot tunnel sumps T-4, T-7, and T-8. Figure 4-4 shows the various sources of waste transferred to tank 104. The contents of tank 104 are transferred to tank 102 for treatment but may be transferred to tank 101 if tank 102 is full. Tank 104 is equipped with an agitator, liquid level indication, and temperature indication. Treatment of waste may occur in tank 104 with the transfer of caustic to the tank via Room 2-B hood 16. Treatment of the waste in tank 104 is a best management practice intended to extend the life of the tank beyond the predicted design life by reducing the corrosion caused by some of the acids in the tank.

4.3.4.3 Tank 102

Tank 102 is the primary treatment tank for mixed waste being transferred to the DST System and receives batches of waste from tank 101 and/or tank 104. The volume of waste treated in tank 102 and the frequency of treatment vary depending on the laboratory workload. Treatment occurs on a batch basis when sufficient volume has accumulated in tank 101 and/or tank 104. When tank 102 contents are transferred to the DST System, the laboratory determines the amount of sodium hydroxide needed to achieve a pH that meets the DST waste acceptance criteria and adds the sodium hydroxide; a sample is taken to ensure that the solution is the appropriate pH. The correct amount of sodium nitrite is added. Samples are collected in the sample gallery from a lead (shielded) sample box, which contains a sample riser and a 4-milliliter-sample-cup air jet. Sampling is performed with a portable sampler.

The tank agitator operates during pH adjustment to prevent spot heating or boiling caused by the addition of large quantities of sodium hydroxide to an acid solution. A tank 102 transfer record is completed to document the transfer. The information required includes the amount of chemicals added during treatment, transfer time, and the volume of water used for flushing the transfer line. Following treatment, the contents in tank 102 are transferred to the DST System by way of underground piping, tank trailer, or to another TSD utilizing other containers.

4.3.4.4 Transfer of Waste by Underground Piping

A total of six underground waste transfer pipelines connect the 222-S Laboratory to the 219-S Waste Handling Facility (Figure 4-5). Four of these pipelines currently are operational and two are spare lines. These pipelines originate from various locations within the 222-S Laboratory. One of the operational pipelines (WT-5702) originates from equipment in Rooms 2-B, 1-J, 1-K, and hot tunnel sump T-4, with one of the spare lines (WT-5701) running parallel from inside tunnel T4 to inside 219-S cell B. Another operational pipeline (WT-5704) originates from hot cells 1-A, 1-E1, 1-E2, 1-F, and hot tunnel sumps T7 and T8, with the other spare line (WT-5703) running parallel from inside tunnel T8 to inside 219-S cell B. The other two operational pipelines (DR-1 and DR-2) are from the 11A hot cells. Origination of each of these lines is discussed in Section 4.1.2. Waste transferred through these pipelines is approved for transfer to the 219-S Tank System.

Liquid waste from tank 102 is normally transferred through underground piping to the DST System (Appendix 4A). Prior to transferring the waste, pre-treatment and post-treatment analyses are conducted on the waste in tank 102. These analyses are submitted to DST System operations for verification that the waste meets DST System acceptance criteria and for approval to transfer. Land disposal restriction information is documented before transfer. For this transfer, the P1 pump is used to transfer the waste out of tank 102 through one of two transfer lines, 219S-SNL-5350 or 219S-SNL-5351, to either 241-SY-101 or 241-SY-103 in the DST System. The routing of the waste is predetermined by DST System operations. A laboratory waste transfer data sheet contained in the laboratory operating procedure is used to initiate the transfer through the underground pipeline. This sheet indicates waste meets the DST System acceptance criteria, records the amount of waste transferred to the DST System, and is retained as an operating record.

4.3.4.5 Tank Trailer or Other Container Transfer

A tank trailer or other containers can also be used for the transfer of waste from tank 102 to the DST System, to an onsite TSD unit, or to an offsite TSD facility. Transfers to another onsite TSD or to an offsite TSD facility are nonroutine requiring special planning and equipment. The 219-S Tank System requires reconfiguration for installation of a pump, jumpers, hoses, venting, and secondary containment for transfer of the liquid mixed waste into a tanker truck or to other containers. Reconfiguration of the 219-S Tank System is done in accordance with applicable sections of WAC 173-3030-640. Transfers other than through the normal underground waste lines would only be considered if the underground line transfer capability was not available or if the waste does not meet DST System acceptance criteria. A laboratory waste transfer data sheet is used to initiate the transfer of the contents of tank 102 to the tank trailer. This data sheet indicates waste is within the onsite TSD unit or offsite TSD facility waste acceptance criteria and records the amount of waste received in the tank trailer and the receiving tank volume. Land disposal restriction information is documented before transfer.

The receiving onsite TSD unit or offsite TSD facility waste profile documentation and transfer/shipment requirements will determine the documentation used to transfer/ship the contents of tank 102 to other containers. Land disposal restriction information is documented before transfer.

Transfer of tank 102 contents to a tank trailer or other container requires staging of the tank trailer or other containers adjacent to the 219-S Tank System. Although transfer operations are designed to minimize staging time adjacent to the 219-S Tank System, the tank trailer or other containers are staged until the transfer to an onsite TSD unit or shipment to an offsite TSD facility is accomplished. Approval to transfer/ship will be obtained from the receiving onsite TSD unit or offsite TSD facility before pumping the tanks.

4.3.4.6 Inspection of Tanks and Surrounding Area

Daily inspections of the 219-S Tank System include but are not limited to evaluation of data gathered from leak detection monitoring (see Chapter 6.0). Leak detectors are installed on the secondary containment for all active drain lines and vault areas of the 219-S Tank System. Leak detectors LDE-1 and LDE-2 detect leaks on lines DR-1 and DR-2, respectively (i.e., 11A hot cell drain lines). Leak detectors LDE-3 and LDE-5 detect leaks on the drain line WT-5704 (i.e., drain line exiting the 222-S Laboratory via tunnel T-4). Leak detectors LDE-4 and LDE-6 detect leaks on WT-5704 (i.e., drain line exiting the 222-S Laboratory via tunnel T-8). The drain line leak detectors are capable of detecting less than 1 liter of liquid that may leak to the secondary containment.

Leak detector WT-LE-7 detects leaks into sump 7, which is located in cell A of the 219-S secondary containment vault, and leak detector WT-LE-9 detects leaks into sump 9, which is located in cell B of the 219-S secondary containment vault. The sump leak detectors each have three alarm settings that provide indications of flow rate of a leak and extent of the leak. These detectors are set to alarm at approximately 4.2 liters, 8.4 liters, and 156 liters.

The basis for using leak detectors and daily data review in lieu of physical tank inspections is radiological health concerns inspecting the data gathered from monitoring equipment results and ALARA considerations. Operating staff would be exposed to considerable radiological exposure from the liquid waste stored in the tanks and residual contamination in the drain lines if physical inspections were to occur. The environment is equivalently protected. The value to human health and the environment resulting from these inspections is less than the human health risk to the operational staff resulting from radiological exposure to the liquid waste stored in the tanks. Refer to Chapter 6.0, Table 6-1, for additional information on inspections.

4.3.5 Labels or Signs [D-2e]

To maintain exposure ALARA, the tanks within the 219-S Tank System are not labeled. Warning signs for the 219-S Tank System are described in Chapter 6.0.

4.3.6 Management of Ignitable or Reactive Waste in Tank Systems [D-2g]

Mixed waste managed in tanks 101, 102, and 104 of the 219-S Tank System does not exhibit the characteristics of ignitability or reactivity. Ignitable and reactive waste can be introduced into the 219-S Tank System ancillary equipment provided that (1) the downstream receiving unit can accept the waste, and (2) compliance with WAC 173-303-395(1) is demonstrated. Ignitable and reactive waste introduced into the 219-S Tank System must have the DEACT (deactivation) treatment standard (deactivation according to 40 CFR 268.42) as a treatment standard option in 40 CFR 268.40. Additional information concerning the DEACT treatment can be found in the waste analysis plan (Appendix 3A).

4.3.7 Management of Incompatible Waste in Tank Systems [D-2h]

Mixed waste managed in the 219-S Tank System is compatible with the tank system. Incompatible waste can be introduced into the 219-S Tank System provided that the WAC 173-303-395(1)(b) requirement is met. Additional information concerning incompatible waste can be found in the waste analysis plan (Appendix 3A).

4.4 AIR EMISSIONS CONTROL [D-8]

This section addresses the 222-S TSD unit requirements for air emission standards under WAC 173-303-692 (Subpart CC) for certain hazardous waste managed in the 222-S DMWSA and the 219-S Waste Handling Facility.

The air emission standards of Subpart CC are applicable to containers having a design capacity greater than 0.1 cubic meter. Labpack configurations are not subject to Subpart CC standards because the inner containers are less than 0.1 cubic meter.

For containers of hazardous waste in containers greater than or equal to 0.1 cubic meter and less than 0.46 cubic meter, Subpart CC standards apply when managing hazardous waste with average volatile organic concentrations equal to or exceeding 500 parts per million by weight, based on the hazardous waste composition at the point of origination. Because containers of hazardous waste in the 222-S DMWSA can be considered "containers in light material service" and stabilization does not occur in containers, Container Level 1 requirements are the only applicable requirements. Container Level 1 standards are met at the 222-S TSD by managing subject hazardous waste in DOT containers [40 CFR 264.1086(f)]. The monitoring requirements for Level 1 containers include a visual inspection when hazardous waste initially is placed in a container at the 222-S TSD.

The liquid mixed waste managed in the 219-S Tank System does not meet the requirements for air emission standards contained in WAC 173-303-691 (Subpart BB) because the waste does not contain organic concentrations at 10 percent or greater (Appendix 3A). The headspace air is exhausted through the 296-S-16 stack as described in Section 4.3.1.1.3.

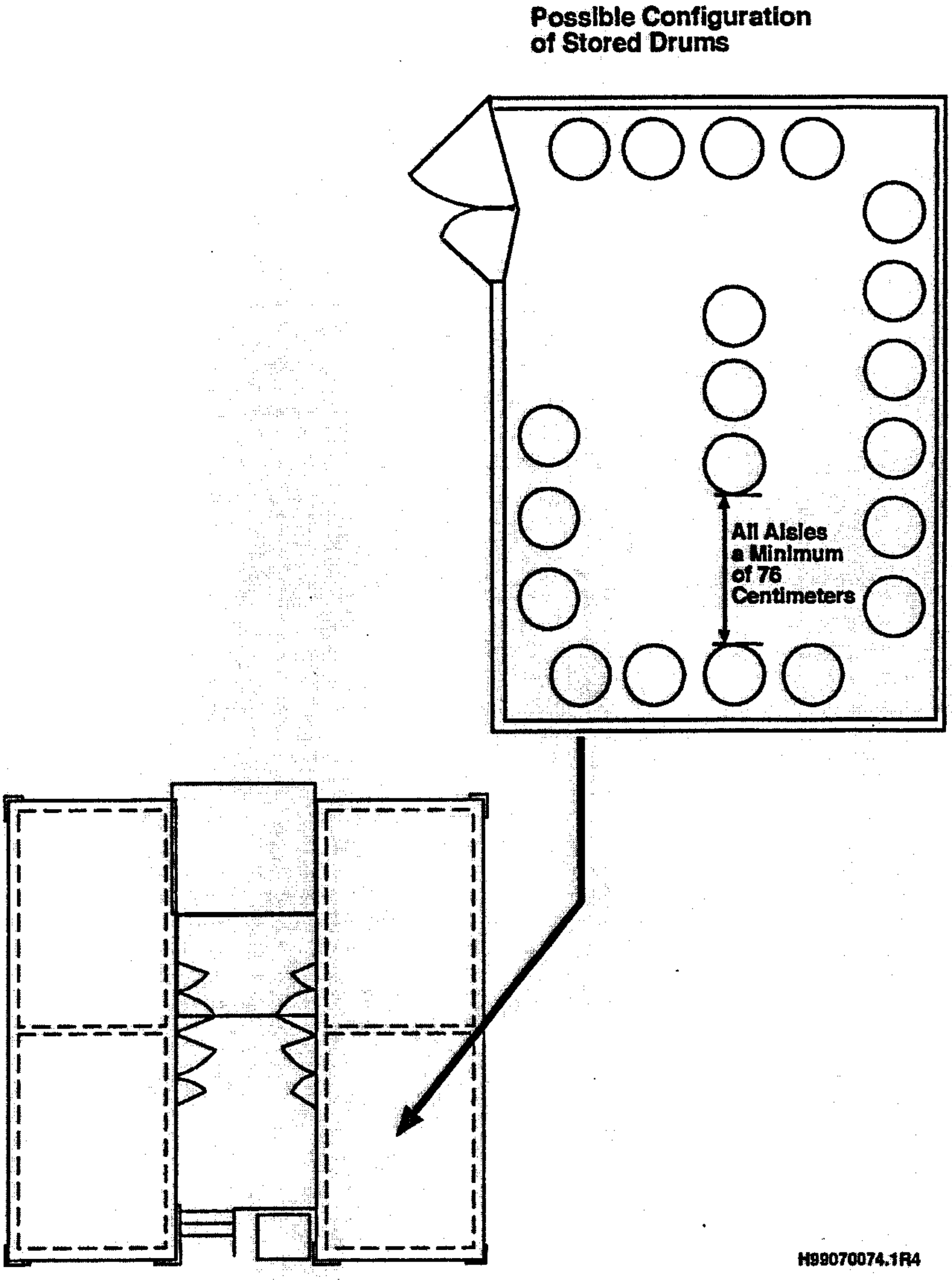

Figure 4-1. General Layout of Storage in 222-S Dangerous and Mixed Waste Storage Area.

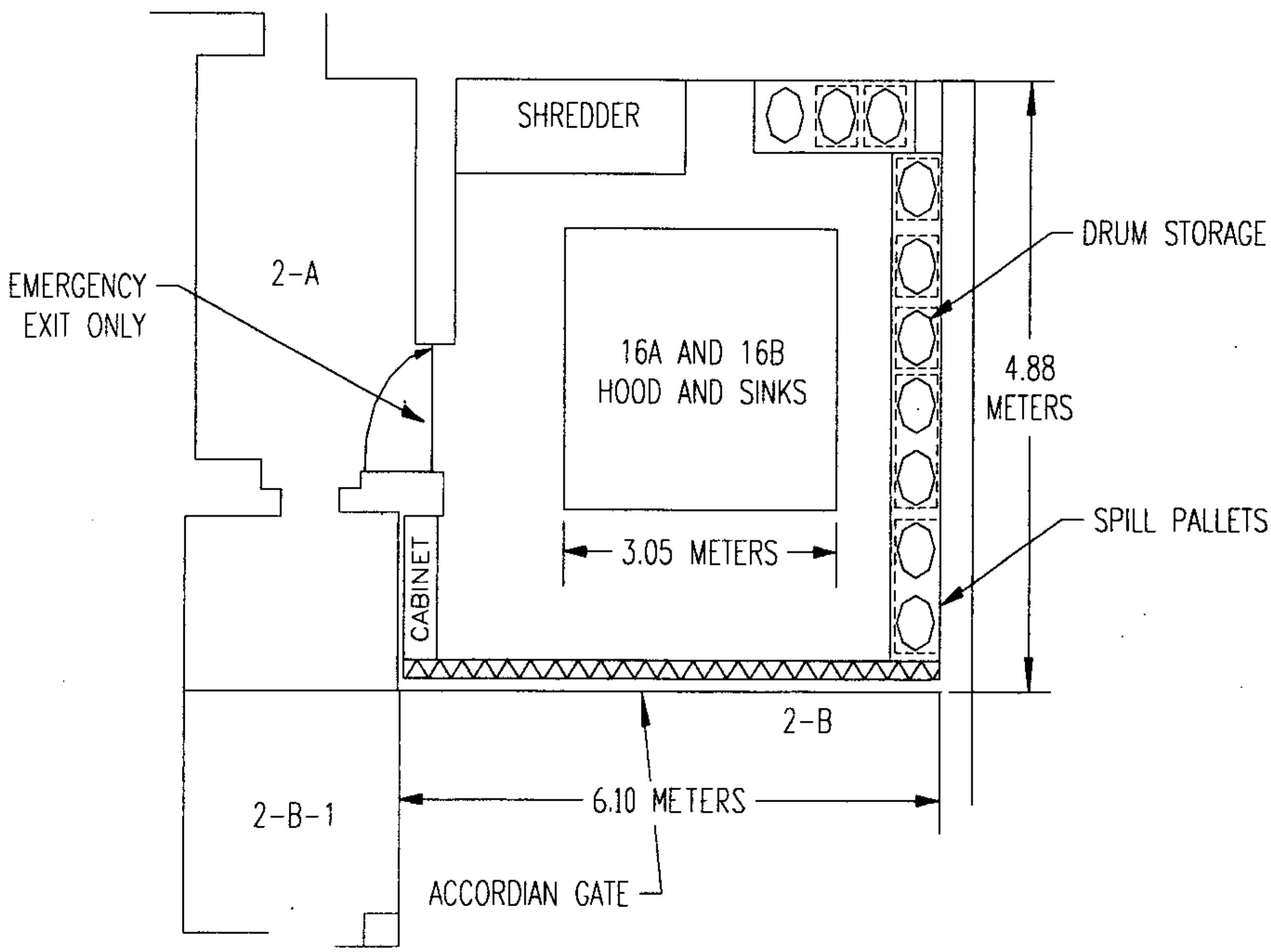

Figure 4-2. General Layout of Room 2-B.

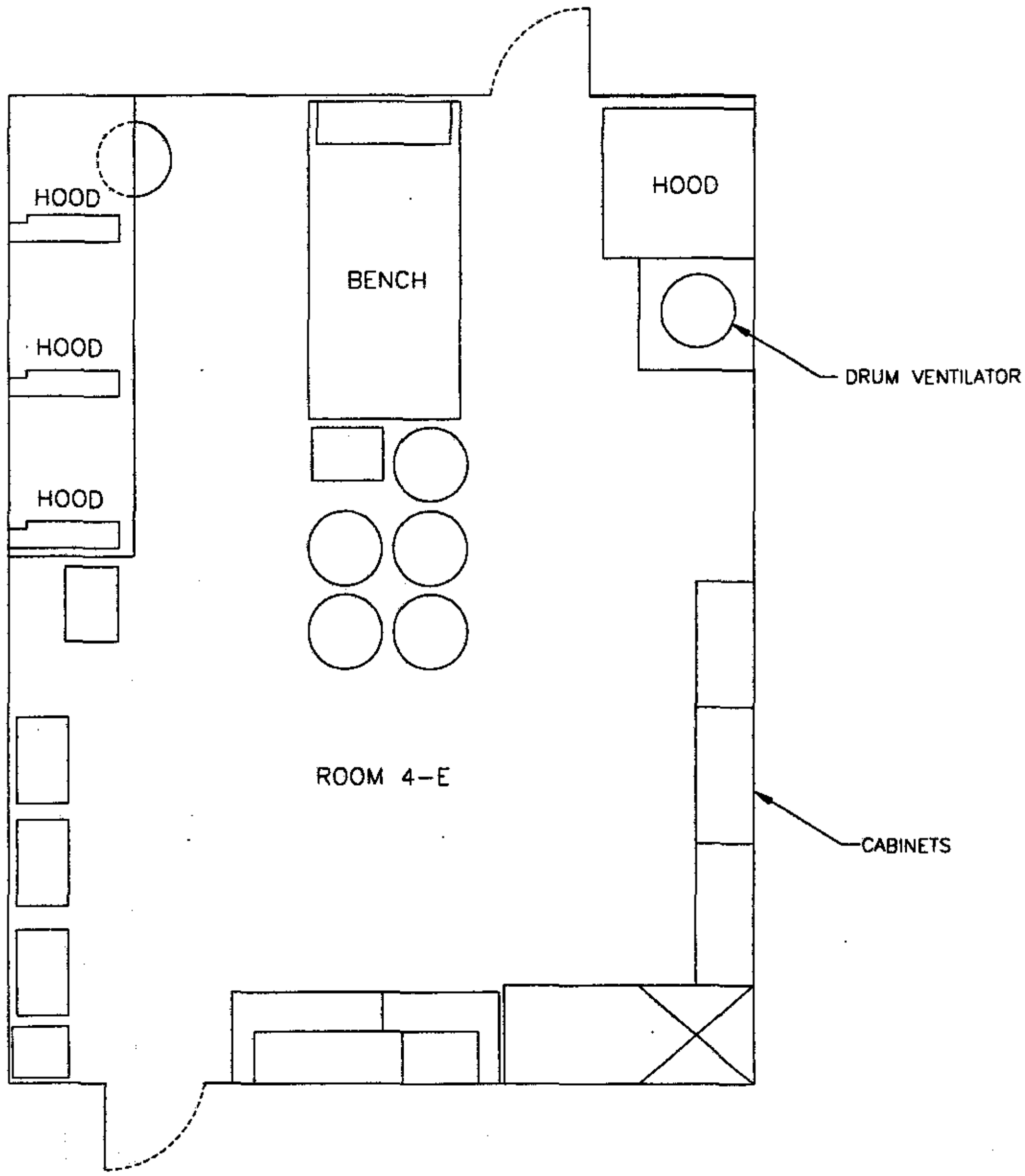

Figure 4-3. General Layout of Room 4-E.

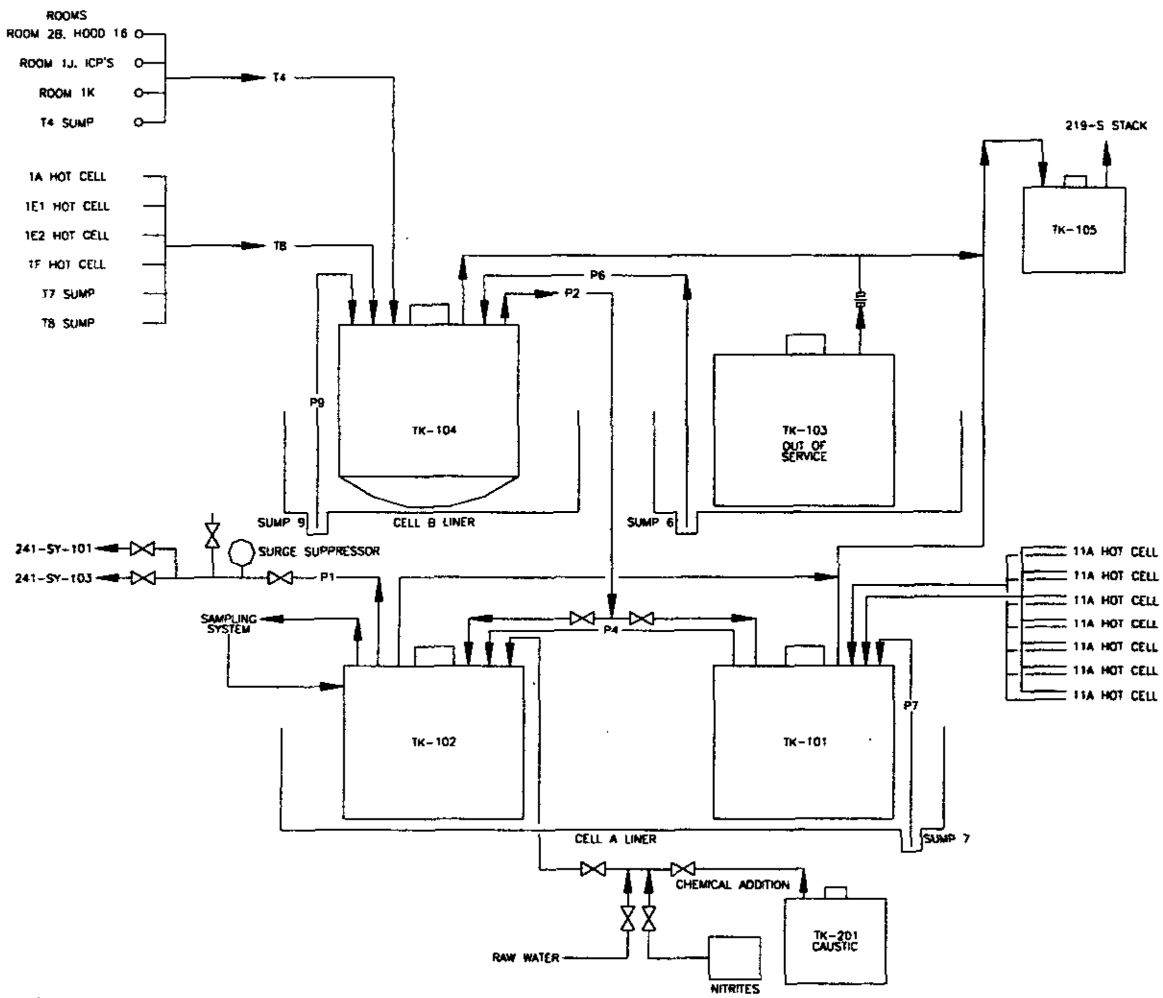

Figure 4-4. Typical Routing for the 219-S Tank System and Associated Systems.

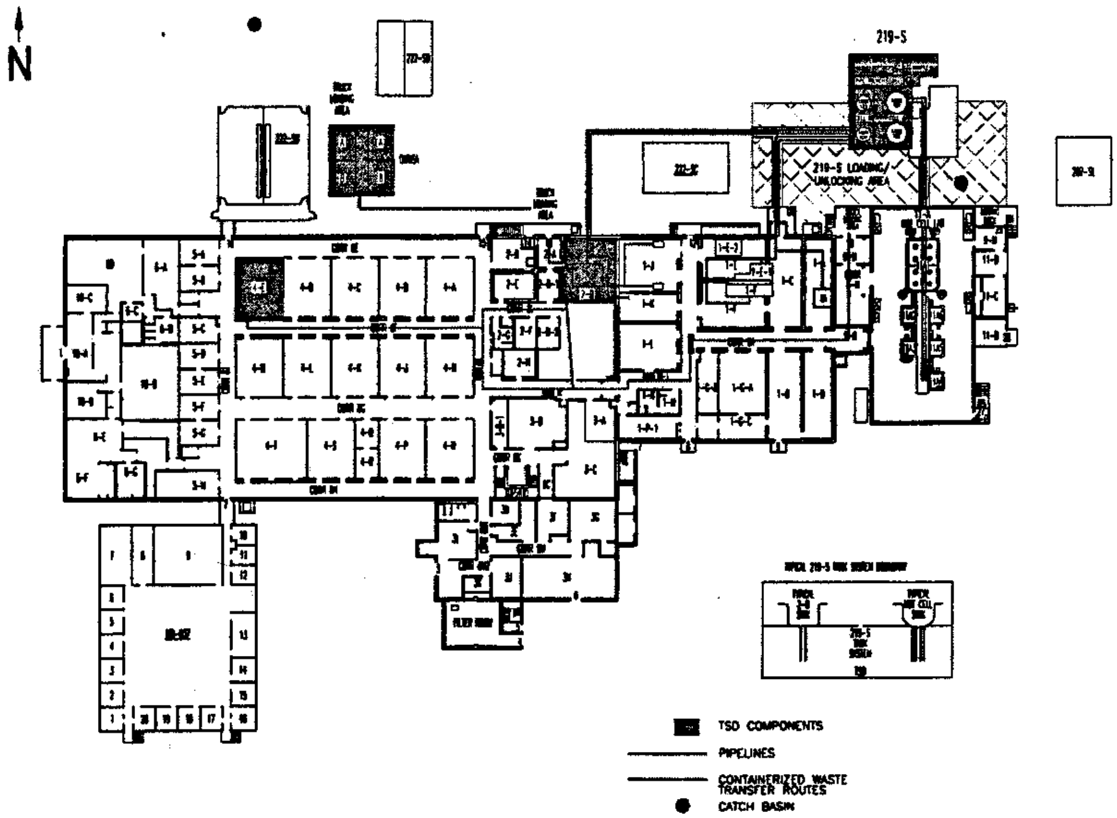

Figure 4-5. 222-S Complex Treatment, Storage, and Disposal Unit Configuration.

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Table 4-1. Listing of 219-S Tank System Ancillary Equipment.

Equipment Identification	Description
219S-HV-305	Motor-operated vent valve for drain lines WT-SNL-5750 and WT-SNL-5751
219S-WT-V-1010	Drain line WT-SNL-5750 secondary containment drain valve
219S-WT-V-1011	Drain line WT-SNL-5751 secondary containment drain valve
219S-WT-V-1012	Drain line WT-SNL-5750 secondary containment vent valve
219S-WT-V-1013	Drain line WT-SNL-5751 secondary containment vent valve
219S-WT-V-5351	WT-P-1 transfer line isolation valve
219S-WT-V-5352	219S-HV-305 vent line check valve
219S-WT-V-5354	Motor-operated valve for isolation of drain line WT-SNL-5751
219S-WT-V-5355	Motor-operated valve for isolation of drain line WT-SNL-5750
WT-V-T3	WT-5702 drain line trap drain valve
WT-V-T4	WT-5704 drain line trap drain valve
WT-V-T10	Isolation valve for transfer to tank 101 from tank 104
WT-V-T11	Isolation valve for transfer to tank 102 from tank 104
WT-V-T12	DR-2 drain line trap drain valve
WT-V-T13	DR-1 drain line trap drain valve
DR-1	Drain line from 11A hot cells
DR-2	Drain line from 11A hot cells.
WT-5701	Spare drain line from tunnel T-4
WT-5702	Active drain line from tunnel T-4
WT-5703	Spare drain line from tunnel T-8
WT-5704	Active drain line from tunnel T-8
219S-SNL-5350	Transfer line from 219-S to 241-SY-101
219S-SNL-5351	Transfer line from 219-S to 241-SY-103
WT-A-101	Tank 101 agitator
WT-A-102	Tank 102 agitator
WT-A-104	Tank 104 agitator
WT-ARSR-1	Transfer line surge suppressor
WT-P-1	Transfer pump P1
WT-P-2	Transfer pump P2
WT-P-4	Transfer pump P4
WT-P-6	Transfer pump P6
WT-P-7	Transfer pump P7
WT-P-9	Transfer pump P9
LDE-1	Leak detector element on drain line DR-1 located outside 219-S vault
LDE-2	Leak detector element on drain line DR-2 located outside 219-S vault
LDE-3	Leak detector element on drain line WT-5702 located outside 219-S vault
LDE-4	Leak detector element on drain line WT-5704 located outside 219-S vault
LDE-5	Leak detector element on drain line WT-5702 located inside tunnel T-4
LDE-6	Leak detector element on drain line WT-5702 located inside tunnel T-8
WT-LE-7	Sump 7 leak detector element
WT-LE-9	Sump 9 leak detector element
LD-1	Drain valve for leak detector LDE-1
LD-2	Drain valve for leak detector LDE-2

Table 4-1. Listing of Ancillary Equipment (Continued).

Equipment Identification	Description
WT-LD-V-3	Drain valve for leak detector LDE-3
WT-LD-V-4	Drain valve for leak detector LDE-4
WT-LD-V-5	Drain valve for leak detector LDE-5
WT-LD-V-6	Drain valve for leak detector LDE-6
WT-CV-P1A	Pump P1 diaphragm air bleed check valve
WT-CV-P1B	Pump P1 diaphragm air bleed check valve
WT-SV-6618	Pump P1 diaphragm solenoid air bleed control valve
WT-PT-5356	Transfer line pressure transmitter
Piping	Miscellaneous cell A and cell B piping jumpers
T-4 sump pump	
T-7 sump pump	
T-8 sump pump	

Table 4-2. Typical Equipment Used in Containerizing Waste for Storage.

Inner Containers
• Polyethylene bottles with liquid-tight screw-on lids • Glass bottles with liquid-tight screw-on lids • Polyethylene bags • Slip-lid cans • 90-mil polyethylene liners.
Sorbent Materials
• Sorbent pads (for organics): cotton batting woven into mesh, 1-liter capacity each • Sorbent material (for aqueous or organics): polyethylene sorbent material, 1-liter capacity each • Fine clay granular sorbent (for aqueous materials primarily) • Diatomaceous earth (for inorganics, especially acids) • Amorphous silicate for organic or inorganic liquids other than acids) • Fine-grained pillow (for inorganics) • Nontreated clay-based sorbents (for inorganics).
Outer Containers
• DOT UN1A1 steel containers with solid lid, seal ring, locknut, and bolt (40 CFR 178.504) • DOT UN1A2 steel containers with solid lid, seal ring, locknut, and bolt (40 CFR 178.504) • 38-liter steel containers with lids and closures • 114-liter steel containers with lids and closures • DOT 208-liter polyethylene containers (40 CFR 178.509) • Plywood boxes (40 CFR 178.514) • Cardboard containers. (40 CFR 178.516)
Labels
• Bottle identification labels • EPA hazardous waste labels • DOT hazard class diamond-shaped labels.

DOT = U.S. Department of Transportation.
EPA = U.S. Environmental Protection Agency.

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Chapter 5.0

CONTENTS

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5.0 GROUNDWATER MONITORING

The 222-S TSD unit (see Chapter 1.0) is not operated as a dangerous or mixed waste surface impoundment, waste pile, land treatment unit, or landfill as defined in WAC 173-303-645(1)(a). Therefore, groundwater monitoring is not required.

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Chapter 6.0

CHAPTER 6.0

PROCEDURES TO PREVENT HAZARDS

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Chapter 7.0

CONTENTS

APPENDIX

TABLE

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7.0 CONTINGENCY PLAN [G]

The WAC 173-303 requirements for a contingency plan are satisfied in the following documents: Portions of the *Hanford Emergency Management Plan* [Attachment 4 of the HF RCRA Permit (DW Portion)] and portions of the *Building Emergency Plan for the 222-S Laboratory Complex* (Appendix 7A).

The unit-specific building emergency plan also serves to satisfy a broad range of other requirements [e.g., Occupational Safety and Health Administration standards (29 CFR 1910), *Toxic Substance Control Act of 1976* (40 CFR 761), and U.S. Department of Energy Orders]. Therefore, revisions made to portions of this contingency plan document that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to WAC 173-303-830 or Hanford Facility RCRA Permit (DW Portion) Condition I.C.3.

Table 7-1 identifies which portions of the building emergency plan are written to meet WAC 173-303 contingency plan requirements. In addition to the building emergency plan portions identified in Table 7-1, Section 12.0 of the building emergency plan is written to meet WAC 173-303 requirements identifying where copies of the *Hanford Emergency Management Plan* and the building emergency plan are maintained on the Hanford Facility. Therefore, revisions to Section 12.0 and the portions identified in Table 7-1 are considered a modification subject to WAC 173-303-830 or Hanford Facility RCRA Permit (DW Portion) Condition I.C.3.

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Table 7-1. Hanford Facility Documents Containing Contingency Plan Requirements of WAC 173-303-350(3)

Requirement	Hanford Emergency Management Plan (DOE/RL-94-02): Attachment 4 of the HF RCRA Permit (DW Portion)	Building Emergency Plan[a] (HNF-IP-0263-222S)
-350(3)(a) - A description of the actions which facility personnel must take to comply with this section and WAC 173-303-360.	X[b] Section 1.3.4	X[b] Sections 7.1, 7.2 through 7.2.5, and 7.3[c] Sections 4.0, 8.2, 8.3, 8.4, 11.0
-350(3)(b) - A description of the actions which shall be taken in the event that a dangerous waste shipment, which is damaged or otherwise presents a hazard to the public health and the environment, arrives at the facility and is not acceptable to the owner or operator but cannot be transported pursuant to the requirements of WAC 173-303-370(5), Manifest system, reasons for not accepting dangerous waste shipments.	X[b] Section 1.3.4	X[b,d] Section 7.2.5.1
-350(3)(c) - A description of the arrangements agreed to by local police departments, fire departments, hospitals, contractors, and state and local emergency response teams to coordinate emergency services as required in WAC 173-303-340(4).	X Sections 3.2.3, 3.3.1, 3.3.2, 3.4, 3.4.1.1, 3.4.1.2, 3.4.1.3, 3.7, and Table 3-1	
-350(3)(d) - A current list of names, addresses, and phone numbers (office and home) of all persons qualified to act as the emergency coordinator required under WAC 173-303-360(1). Where more than one person is listed, one must be named as primary emergency coordinator, and others must be listed in the order in which they will assume responsibility as alternates. For new facilities only, this list may be provided to the department at the time of facility certification [as required by WAC 173-303-810 (14)(a)(I)] rather than as part of the permit application.		X[e] Section 3.1, 13.0
-350(3)(e) - A list of all emergency equipment at the facility (such as fire extinguishing systems, spill control equipment, communications and alarm systems, and decontamination equipment) where this equipment is required. This list must be kept up to date. In addition, the plan must include the location and a physical description of each item on the list and a brief outline of its capabilities.	X Hanford Fire Department: Appendix C	X Section 9.0

Table 7-2. Hanford Facility Documents Containing Contingency Plan Requirements of WAC 173-303-350(3) (Continued)

Requirement	Hanford Emergency Management Plan (DOE/RL-94-02): Attachment 4 of the HF RCRA Permit (DW Portion)	Building Emergency Plan[a] (HNF-IP-0263-222S)
-350(3)(f) - An evacuation plan for facility personnel where there is a possibility that evacuation could be necessary. This plan must describe the signal(s) to be used to begin evacuation, evacuation routes, and alternate evacuation routes.	X[f] Figure 7-3 and Table 5-1	X[g] Section 1.5

An 'X' indicates requirement applies.

[a] Portions of the *Hanford Emergency Management Plan* not enforceable through Appendix A of that document are not made enforceable by reference in the building emergency plan.

[b] The *Hanford Emergency Management Plan* contains descriptions of actions relating to the Hanford Site Emergency Preparedness System. No additional description of actions are required at the site level. If other credible scenarios exist or if emergency procedures at the unit are different, the description of actions contained in the building emergency plan will be used during an event by a building emergency director.

[c] Sections 7.1, 7.2 through 7.2.5, and 7.3 of the building emergency plan are those sections subject to the Class 2 "Changes in emergency procedures (i.e., spill or release response procedures)" described in WAC 173-303-830, Appendix I Section B.6.a.

[d] This requirement only applies to TSD units that receive shipment of dangerous or mixed waste defined as offsite shipments in accordance with WAC 173-303.

[e] Emergency Coordinator names and home telephone numbers are maintained separate from any contingency plan document, on file in accordance with Hanford Facility RCRA Permit (DW Portion) General Condition II.A.4. and is updated, at a minimum, monthly.

[f] The Hanford Facility (sitewide) signals are provided in this document. No unit/building signal information is required unless unique devices are used at the unit/building.

[g] An evacuation route for the TSD unit must be provided. Evacuation routes for occupied buildings surrounding the TSD unit are provided through information boards posted within buildings.

Chapter 8.0

CONTENTS

TABLE

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8.0 PERSONNEL TRAINING [H]

This chapter discusses personnel training requirements based on WAC 173-303 and the Hanford Facility RCRA Permit (DW Portion). In accordance with WAC 173-303-806(4)(a)(xii), the *Hanford Facility Dangerous Waste Part B Permit Application* must contain two items: (1) "an outline of both the introductory and continuing training programs by owners or operators to prepare persons to operate or maintain the TSD facility in a safe manner as required to demonstrate compliance with WAC 173-303-330" and (2) "a brief description of how training will be designed to meet actual job tasks in accordance with the requirements in WAC 173-303-330(1)(d)." The Hanford Facility RCRA Permit (DW Portion), Condition II.C (Personnel Training), contains training requirements applicable to Hanford Facility personnel and non-Facility personnel.

Compliance with these requirements at the 222-S Laboratory Complex is demonstrated by information contained both in Chapter 8.0 of DOE/RL-91-28, Attachment 33 of the Hanford Facility RCRA Permit, and this chapter. This chapter supplements Chapter 8.0 of DOE/RL-91-28.

8.1 OUTLINE OF INTRODUCTORY AND CONTINUING TRAINING PROGRAMS

The introductory and continuing training programs are designed to prepare personnel to manage and maintain the TSD unit in a safe, effective, and environmentally sound manner. In addition to preparing personnel to manage and maintain the TSD unit under normal conditions, the training programs ensure that personnel are prepared to respond in a prompt and effective manner should abnormal or emergency conditions occur. Emergency response training is consistent with the description of actions contained in Chapter 7.0. The introductory and continuing training programs contain the following objectives:

- Teach Hanford Facility personnel to perform their duties in a way that ensures the Hanford Facility's compliance with WAC 173-303
- Teach Hanford Facility personnel dangerous waste management procedures (including implementation of the contingency plan) relevant to the job titles/positions in which they are employed, and
- Ensure Hanford Facility personnel can respond effectively to emergencies.

8.1.1 Introductory Training

Introductory training includes general Hanford Facility training and TSD unit-specific training. General Hanford Facility training is described in DOE/RL-91-28, Section 8.1, and is provided in accordance with the Hanford Facility RCRA Permit (DW Portion), Condition II.C.2. TSD unit-specific training is provided to Hanford Facility personnel allowing those personnel to work unescorted and in some cases is required for escorted access. Hanford Facility personnel cannot perform a task for which they are not properly trained, except to gain required experience while under the direct supervision of a supervisor or coworker who is properly trained. Hanford Facility personnel must be trained within 6 months after their employment at or assignment to the Hanford Facility, or to a new job title/position at the Hanford Facility, whichever is later.

<u>General Hanford Facility training:</u> Refer to description in DOE/RL-91-28, Section 8.1.

Contingency Plan training: Hanford Facility personnel receive training on applicable portions of the *Hanford Emergency Management Plan* [Attachment 4 of the Hanford Facility RCRA Permit (DW Portion)] in general Hanford Facility training. In addition, Hanford Facility personnel receive training on content of the description of actions contained in contingency plan documentation in Chapter 7.0 and Appendix 7A to be able to effectively respond to emergencies.

Emergency Coordinator training: Hanford Facility personnel who perform emergency coordinator duties in WAC 173-303-360 (e.g., building emergency director) in the Hanford Incident Command System receive training on implementation of the contingency plan and fulfilling the position within the Hanford Incident Command System. These Hanford Facility personnel also must become thoroughly familiar with applicable contingency plan documentation, operations, activities, location, and properties of all waste handled, location of all records, and the unit/building layout.

Operations training: Dangerous waste management operations training (e.g., waste designation training, shippers training) is determined on a unit-by-unit basis and considers the type of waste management unit (e.g., container management unit) and the type of activities performed at the waste management unit (e.g., sampling). For example, training provided for management of dangerous waste in containers is different than the training provided for management of dangerous waste in a tank system. Common training required for compliance within similar waste management units can be provided in general training and supplemented at the TSD unit. Training provided for TSD unit-specific operations is identified in the training plan documentation based on (1) whether a general training course exists, (2) the training needs to ensure waste management unit compliance with WAC 173-303, and (3) training commitments agreed to with Ecology.

8.1.2 Continuing Training

Continuing training meets the requirements for WAC 173-303-330(1)(b) and includes general Hanford Facility training and TSD unit-specific training.

General Hanford Facility training: Annual refresher training is provided for general Hanford Facility training. Refer to description in DOE/RL-91-28, Section 8.1.

Contingency plan training: Annual refresher training is provided for contingency plan training. Refer to description in Section 8.1.1.

Emergency coordinator training: Annual refresher training is provided for emergency coordinator training. Refer to description in Section 8.1.1.

Operations training: Refresher training occurs on many frequencies (i.e., annual, every other year, every 3 years) for operations training. When justified, some training will not contain a refresher course and will be identified as a one-time-only training course. The TSD unit-specific training plan documentation specifies the frequency for each training course. Refer to description in Section 8.1.1.

8.2 DESCRIPTION OF TRAINING DESIGN

Proper design of a training program ensures personnel who perform duties on the Hanford Facility related to WAC 173-303-330(1)(d) are trained to perform their duties in compliance with WAC 173-303. Actual job tasks, referred to as duties, are used to determine training requirements. The first step taken to ensure

Hanford Facility personnel have received the proper training is to determine and document the waste management duties by job title/position. The second step compares waste management duties to general waste management unit training curriculum. If general waste management unit training curriculum does not address the waste management duties, the training curriculum is supplemented and/or on-the-job training is provided. The third step summarizes the content of a training course necessary to ensure that the training provided to each job title/position addresses associated waste management duties. The last step is to assign training curriculum to Hanford Facility personnel based on the previous evaluation. The training plan documentation contains this process.

Waste management duties include those specified in Section 8.1 as well as those contained in WAC 173-303-330(1)(d). Training elements of WAC 173-303-330(1)(d) applicable to the 222-S Laboratory Complex operations include the following:

- Procedures for using, inspecting, repairing, and replacing emergency and monitoring equipment
- Communications or alarm systems
- Response to fires or explosions
- Shutdown of operations.

Hanford Facility personnel who perform these duties receive training pertaining to their duties. The training plan documentation described in Section 8.3 contains specific information regarding the types of training Hanford Facility personnel receive based on the outline in Section 8.1.

Additional training elements assigned by Ecology, applicable to the 222-S Laboratory Complex operations, include the following:

- Procedures for safely managing dangerous waste including inspections, recordkeeping practices for repairs and remedial actions taken as a result of the inspections, labeling, and incompatible waste management

- Response to spills/releases.

8.3 DESCRIPTION OF TRAINING PLAN

In accordance with Hanford Facility RCRA Permit (DW Portion), Condition II.C.3, the unit-specific portion of the *Hanford Facility Dangerous Waste Permit Application* must contain a description of the training plan. Training plan documentation is maintained outside of the *Hanford Facility Dangerous Waste Part B Permit Application* and the Hanford Facility RCRA Permit. Therefore, changes made to the training plan documentation are not subject to the Hanford Facility RCRA Permit modification process. However, the training plan documentation is prepared to comply with WAC 173-303-330(2).

Documentation prepared to meet the training plan consists of hard copy and/or electronic media as provided by Hanford Facility RCRA Permit (DW Portion), Condition II.C.1. The training plan documentation consists of one or more documents and/or a training database with all the components identified in the core document.

A description of how training plan documentation meets the three items in WAC 173-303-330(2) is as follows.

- -330(2)(a): "The job title, job description, and name of the employee filling each job. The job description must include requisite skills, education, other qualifications, and duties for each position."

  Description: The specific Hanford Facility personnel job title/position is correlated to the waste management duties. Waste management duties relating to WAC 173-303 are correlated to training courses to ensure training properly is assigned.

  Only names of Hanford Facility personnel who carry out job duties relating to TSD unit waste management operations at the 222-S Laboratory Complex are maintained. Names are maintained within the training plan documentation. A list of Hanford Facility personnel assigned to the 222-S Laboratory Complex is available on request.

  Information on requisite skills, education, and other qualifications for job titles/positions is addressed by providing a reference where this information is maintained (e.g., human resources). Specific information concerning job title, requisite skills, education, and other qualifications for personnel can be provided on request.

- -330(2)(b): "A written description of the type and amount of both introductory and continuing training required for each position."

  Description: In addition to the outline provided in Section 8.1, training courses developed to comply with the introductory and continuing training programs are identified and described in the training plan documentation. The type and amount of training is specified in the training plan documentation as shown in Table 8-1.

- -330(2)(c): "Records documenting that personnel have received and completed the training required by this section. The Department may require, on a case-by-case basis, that training records include employee initials or signature to verify that training was received."

  Description: Training records are maintained consistent with DOE/RL-91-28, Section 8.4.

Table 8-1. 222-S Laboratory Complex Training Matrix.

	Training Category[a]					
DOE/RL-91-28 Chapter 8 Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training		
222-S Laboratory Complex DWTP Implementing Category	Orientation Program	Emergency Response (contingency plan)	Emergency Coordinator Training	General Waste Management	Container Management	Tank System Management
Job Title/Position						
Hazardous Waste Operations Manager/Lead	X	X		X	X	
Chemical Technologist (Hazardous Waste Operations)	X	X		X	X	X
Senior Environmental Lead	X			X		
Analytical Chemistry Manager	X					
Chemistry Manager	X					
Chemist/Scientist	X				X	X
Chemical Technologist	X	X		X	X	X
Facility Operation Manager/Lead	X	X	X	X		X
Resident Waste Service Provider	X			X	X	
Non-Resident Waste Service Provider	X			X	X	
On-call Building Emergency Director	X	X	X			
On-call Technical Point of Contact	X	X				

[a] Refer to the 222-S Laboratory Complex Dangerous Waste Training Plan for a complete description of coursework in each training category.

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Chapter 9.0

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9.0 EXPOSURE INFORMATION REPORT

The 222-S TSD Unit does not store, treat, or dispose of dangerous or mixed waste in a surface impoundment or landfill as defined in 40 CFR 270.10(j) and RCRA, Section 3019, and therefore exposure information is not required.

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Chapter 10.0

CONTENTS

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10.0 WASTE MINIMIZATION

To fulfill the requirements of WAC 173-303-380(1)(q), a certification that the 222-S TSD unit has a waste minimization/pollution prevention program in place is entered, annually, into the 222-S TSD unit operating record.

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Chapter 11.0

CONTENTS

APPENDIXES

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11.0 CLOSURE AND FINANCIAL ASSURANCE [I]

This chapter describes the planned activities and performance standards for closing the waste management units in the 222-S Laboratory Complex. Closure will begin when the 222-S Laboratory Complex TSD components are no longer managing hazardous or mixed waste (Section 11.5).

11.1 CLOSURE PLAN/FINANCIAL ASSURANCE FOR CLOSURE [I-1]

Achievement of the closure performance standards (Section 11.2) specified in this closure plan will allow clean closure of the 222-S TSD components (219-S Waste Handling Facility, 222-S DMWSA, and Rooms 2-B and 4-E container storage areas) with respect to dangerous and/or mixed waste contamination that resulted from operations. All solid waste management units (SWMU) and known releases (unplanned releases) associated with the 222-S Laboratory Complex are listed in Appendix 11A. There are two categories of SMWUs: those found in Appendix C of the Hanford Federal Facility Agreement and Consent Order (HFFACO) (aka TPA) which will be remediated under §120 of the Comprehensive Environmental Compensation and Liability Act (CERCLA); and those sites found in Appendix B of the HFFACO that are part of the 222-S TSD unit and will be closed under this closure plan. Unplanned release sites are found in HFFACO Appendix C and therefore will be managed under CERCLA in accordance with Section 3.5 of the HFFACO.

In cases where clean closure performance standards may not be met for either the TSD components or SWMUs, alternative closure options may be pursued under Condition II.K of the Hanford Facility RCRA permit or alternative performance standards may be applied pursuant to WAC 173-303-610 (see Section 11.2). If opportunities come about to integrate CERCLA and RCRA cleanup requirements, a request to Ecology will be made through modification of this closure plan.

Any modification of this closure plan will be performed in accordance with WAC 173-303-830. Remedial actions with respect to contamination resulting from activities not associated with management of regulated waste in these waste management units are outside the scope of this closure plan.

As described in Condition II.H.3 of the Hanford Facility RCRA Permit (DW Portion), federal facilities are not required to comply with financial assurance requirements of WAC 173-303-620.

11.2 CLOSURE PERFORMANCE STANDARD [I-1a]

Clean closure, as provided in this chapter and in accordance with WAC 173-303-610(2) and Ecology Guidance for Clean Closure (Ecology 2005), requires that all TSD units be closed in a manner that

- Minimizes the need for further maintenance

- Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, and dangerous waste decomposition products to the ground, surface water, ground water, and air

- Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

In addition to compliance with the performance standard, clean closure requires the removal or decontamination of all dangerous waste, waste residues, and equipment, bases, liners, soils/subsoils, and other material containing or contaminated with dangerous waste or waste residue. Clean closure requires that removal and decontamination be based on the following:

- For soils, ground water, surface water, and air, the numeric cleanup levels are calculated using unrestricted use exposure assumptions. For all structures, equipment, bases, liners, etc., clean closure standards will be set by the department on a case-by-case basis in accordance with the closure performance standards of WAC 173-303-610 (2)(a)(ii) and in a manner that minimizes or eliminates post-closure escape of dangerous waste constituents.

- Cleanup levels for the TSD unit contaminants of concern (COC) standards will be established through WAC-173-303-610(2)(b)(i) and (ii). In the event that clean closure is not feasible, alternative requirements maybe applied pursuant to Condition II.K of the Hanford Facility RCRA Permit and WAC-173-303-610(1)(e)(ii) if applicable.

- Condition II.K allows for several closure options that do not rely on meeting clean closure performance standards. Examples include closing to existing background levels, performing a modified closure using *Model Toxic Control Act* method C values and performing a landfill closure (which is also allowed under WAC 173-303-665 for regulated units).

For a site to qualify to use alternative cleanup standards under WAC 173-303-610(1)(e), Ecology must agree with the following conditions:

The site must be

> . . . a dangerous waste unit is situated among other solid waste management units or areas of concern, a release has occurred, and both the dangerous waste unit and one or more of the solid waste management units or areas of concern are likely to have contributed to the release; and
>
> It is not necessary to apply the requirements of this section (or the unit-specific requirements referenced in subsection (2)(b) of this section) because the alternative requirements will protect human health and the environment.

11.2.1 Constituents of Concern

The COC for the 222-S Laboratory Complex TSD components and SWMUs are currently based on information provided in the Part A form (Chapter 1.0). These waste numbers provided in the Part A form in combination with any spill history will be used to determine a comprehensive list of COCs at the time of closure.

11.2.2 Closure Standards

In accordance with WAC 173-303-640(8), clean closure of the 219-S Tank System would require that all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment be removed or decontaminated, and managed as dangerous waste unless WAC 173-303-070 (2)(a) applies. It further states that the closure plan must meet applicable requirements in WAC 173-303-610.

In accordance with WAC 173-303-630(10) clean closure of a containment structure (i.e., Room 2-B, Room 4-E, and the DMWSA), requires that all dangerous waste and dangerous waste residues be removed from the containment system. Remaining containers, liners, bases, and soil containing or contaminated with dangerous waste or dangerous waste residues must be decontaminated or removed.

WAC-173-303-610 stipulates that for all structures, equipment, bases, liners, etc., clean closure standards will be set by the department on a case-by-case basis in accordance with the closure performance standards of WAC 173-303-610 (2)(a)(ii) and in a manner that minimizes or eliminates post-closure escape of dangerous waste constituents. Section 11.2.2.1 proposes that a "clean debris surface" standard be used to achieve clean closure for all metal surfaces.

11.2.2.1 Closure Standard for Metal Surfaces

Closure activities will use a 'clean debris surface' as the clean closure performance standard for metal surfaces. Metal surfaces encountered during closure will include, but not be limited to, tanks, piping, ancillary equipment, tank system secondary containment liners, laboratory hoods (e.g., hood 16 in Room 2-B), and 222-S DMWSA structures. Tanks 101, 102, and 104, and the 222-S DMWSA are not expected to be generated as debris. Tank 103 has been pumped, rinsed, and isolated, and will not be decontaminated further. Tank 103 will be generated as hazardous debris and managed at an appropriate TSD unit. Piping and laboratory hoods are expected to be generated as debris. Tank system secondary containment liners could be generated as debris depending on circumstances at the time of closure. This approach is consistent with Ecology guidance (Ecology 2005) for achievement of clean closure.

For metal surfaces, attainment of a clean debris surface will be verified visually in accordance with the alternative treatment standards for hazardous debris (40 CFR 268.45):

> Clean debris surface means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

Metal surfaces, except piping, requiring decontamination based on visual examination will be decontaminated using an appropriate physical or chemical extraction technology from the alternative treatment standards for hazardous debris (40 CFR 268.45). Chemical extraction methods are not subject to residence time requirements. Piping will be rinsed to achieve a clean debris surface. Before using a decontamination solution on any liner surface or surface having potential contact with underlying soil, the liner or surface must be inspected for cracks or other openings that could provide a pathway to the soil. Any such cracks will be sealed before beginning treatment, or other engineered containment devices (e.g., portable catch basins, liners) will be used to collect and contain solutions. Areas of obvious staining, discoloration, cracking, or potential contamination with COC will be reevaluated for more rigorous decontamination or removal, designation, and disposal.

Debris, as well as any generated rinsate, will be removed, designated, and disposed of at an appropriate location. Removed nondebris matrices not meeting performance standards will be managed as hazardous or mixed waste (depending on presence of radioactive contaminants) unless information exists otherwise.

Piping stored in the T-8 tunnel will be removed at closure. If technology allows internal inspection of the piping, the piping could be evaluated for a clean debris surface. If technology does not allow inspection of internal surfaces or personnel exposure issues exist, the piping will be managed as mixed hazardous debris and moved to an appropriate TSD unit.

11.2.2.2 Closure Standard for Concrete

The performance standard for concrete will be a clean debris surface based on visual verification. When the performance standard is not met, decontamination of concrete will be accomplished using a physical or chemical extraction technology from the alternative treatment standards for hazardous debris (40 CFR 268.45). Chemical extraction methods are not subject to residence time requirements. Physical extraction methods are not subject to the 0.6-centimeter removal requirement. When a water-based decontamination method is used, the rinsate will be tested for the COC (Section 11.2.1). The performance standard will provide verification that the levels of the COC in the rinsate are below health-based risk levels as identified in WAC 173-303-610(2)(b). The concrete will be examined visually after decontamination. Areas of obvious staining, discoloration, cracking, or potential contamination with COC will be reevaluated for more rigorous decontamination or removal, designation, and disposal.

11.2.2.3 Closure Standards for Asphalt

A layer of asphalt (Chapter 4.0, Section 4.2.4.1.1) lies underneath the 6-inch concrete base for the DMWSA and underlays the load/unloading areas. Asphalt is considered a form of porous debris and is subject to the same treatment standards as concrete (Ecology 2005); however, if asphalt does meet the clean debris surface, decontamination is not common because of its porosity and therefore will be removed and managed as hazardous debris unless a contained-in determination is granted by Ecology. If a contained-in determination is granted, then the asphalt would be considered as nonhazardous debris and could be disposed of in a RCRA Subtitle D landfill. Any soils underneath will be characterized to determine whether removal will be necessary (Section 11.2.5).

11.2.2.4 Closure Standards for Underlying Soil

If there are no cracks in concrete overlaying soil, the soil will be considered clean closed. If concrete surfaces are cracked, the concrete will be cored at the crack in the concrete to obtain a soil sample. Clean closure of soil under concrete and concrete plus asphalt (the 219-S Waste Handling Facility and the 222-S DMWSA, respectively) will require sampling of the soil for COCs. If the soil testing results determine that the COCs are at or below cleanup levels, the soil will be considered clean closed and will not require remediation. Cleanup levels for soil are defined by the Hanford Facility RCRA Permit (DW Portion), Condition II.K.1, and WAC 173-303-610(2)(b).

Clean closure of the soil underlying Rooms 2-B and 4-E will be accomplished by demonstrating that there are no pathways for dangerous waste to the underlying soil. Operating records will be checked to verify that cleanup of any spills within Room 2-B and/or Room 4-E was performed. Room 2-B is located partially above a tunnel, which is in the basement of the 222-S Laboratory. The floors of Room 2-B and Room 4-E will be checked for cracks. Any cracks that are found will be investigated.

If clean closure can not be obtained for soils underlying TSD SWMUs listed in HFFACO Appendix B (i.e., 222-S TSD components) other closure options will be considered (section 11.2) including integration with planned CERCLA activities. RCRA/CERCLA integration would require an Ecology approved modification to the existing closure plan.

Soils underlying SWMUs, listed in Appendix C of the HFFACO will be cleaned up under a CERCLA action.

11.3 CLOSURE ACTIVITIES [I-1b]

In accordance with WAC 173-303-610 and Ecology Guidance for Clean Closure (Ecology 2005), the following activities to achieve clean closure are required:

- Remove and properly manage all wastes and waste residues from the 222-S TSD Components and SMWUs

- Remove and properly manage 222-S TSD components, structures, and all associated piping, equipment, containment areas, and any other materials used in construction or operation of the unit, or decontaminate these materials

- Remove and properly mange any environmental media (soil, ground water, surface water, and sediments) affected by releases from the 222-S TSD components and SWMUs or decontaminate such environmental media.

Clean closure will be accomplished by proper implementation of this closure plan. If it is determined that clean closure is not possible, the closure plan will be modified to address required post-closure activities in WAC 173-303-610. RCRA/CERCLA integration may also be considered as an alternative closure option .

Access to the 219-S Waste Handling Facility, the 222-S DMWSA, and Room 2-B and Room 4-E storage areas will be controlled during the closure period. Access will be limited to personnel required to support the closure of the units. All activities will be performed to minimize personnel exposure in accordance with ALARA principles.

11.3.1 Maximum Extent of Operation [I-1b(1)]

The maximum extent of operation for the waste management units is provided in Chapter 1.0.

A portion of the ancillary piping located in the 222-S Laboratory tunnels was removed from service in 1997. The removal and staging of the high-dose drain piping in a shielded staging area in the T8 tunnel within the 222-S Laboratory was agreed to by Ecology (99-EAP-446). During unit closure, this piping will be designated and managed in an appropriate waste management unit or TSD unit.

A closure was completed on two storage structures previously located at the 222-S DMWSA (Appendix 11B). The structures were clean closed, removed from the area, and replaced with two new storage structures in 1998 (Chapter 2.0). The concrete below the removed structures was not closed. Closure of underlying soil and the concrete was deferred to the closure of the 222-S DMWSA.

Appendix 11B contains the following information for the previously closed and removed storage structures:

- Partial closure plan
- Ecology approval letter
- Professional engineer certification for the partial closure.

With Ecology concurrence, tank 103 in the 219-S Waste Handling Facility was isolated in 1999 (Ecology Change Control Form M-32-98-01). Tank 103 is included in this closure plan.

11.3.2 Operations Records Search

Operating records will be reviewed and cognizant operations personnel interviewed to obtain an inventory and spill history for the units undergoing closure. A spill history is necessary to help determine the need for and extent of decontamination necessary for clean closure. The records review will entail a review of all available records related to operations in the treatment and/or storage units. The records review will include operations logbooks, RCRA weekly inspection records, a search for 'offnormal' event reports, and the waste identification data system. Former cognizant operation personnel could be interviewed.

11.3.3 Closure Activities for the 219-S Waste Handling Facility [I-1b(3)]

This closure plan describes the methods of decontamination and equipment removal in accordance with WAC 173-303-610(5). Any waste generated during decontamination and equipment removal will be managed pursuant to WAC 173-303-170 through 173-303-230.

Decontamination and equipment removal will occur for the following portions of the 219-S Waste Handling Facility:

- 219-S Waste Handling Facility structure
- Truck load in/out areas
- Process tanks, piping, and ancillary equipment
- Below-grade concrete vault structure
- External piping and ancillary equipment
- Underlying soil.

Equipment, piping, and materials that can not be decontaminated will be removed and transported to an appropriate TSD unit for final disposition.

Clean closure of underlying soil will be based on testing results. If the soil is contaminated above regulatory limits specified in the Hanford Facility RCRA Permit (DW Portion), Condition II.K.1, the contaminated areas will be defined and the soil will be removed. Removed soil will be designated and disposed of in an appropriate location.

11.3.3.1 Removing Dangerous Waste [I-1b(2)]

The mixed waste inventory contained within the 219-S Waste Handling Facility (i.e., tanks 101, 102, and 104) will be removed using the existing process equipment and pumps. Decontamination of the tanks including removal of tank heel and residues will occur pursuant to 40 CFR 268.45 and WAC 173-303-610(5). The mixed waste contained in the tanks will be transferred to an appropriate TSD unit for disposition.

11.3.3.2 219-S Waste Handling Facility Structure

The operating gallery in the 219-S Waste Handling Facility never was used for the processing of mixed waste or the storage of dangerous materials. The 219-S Waste Handling Facility contains equipment and structures (e.g., the walls and ceiling of the operating gallery, the control panel, and the rinsed caustic tank) that are not expected to have become contaminated because of functional and physical separation from the waste treatment and storage areas. The uncontaminated equipment and structures will be left in place for future use or dismantled and/or removed as required.

11.3.3.3 Truck Load in/out Platforms

All the container storage areas have load-in and load-out platforms (Chapter 4.0). Once the load-in and load-out platforms are no longer needed, all containerized waste will be transferred from the platforms to either an onsite or offsite TSD unit. The spill history for the platforms will be reviewed, and platform surfaces will be visually inspected for staining. Any evidence of contamination will be addressed by appropriate decontamination and sampling procedures as specified by this closure plan. Clean closure will be achieved by meeting the performance standards (Sections 11.2.2, 11.2.2.1, 11.2.2.2, 11.2.2.3, and 11.2.2.4) for metal, concrete, and asphalt surfaces as appropriate. In the event that clean closure is unachievable, the platforms will be removed and handled as hazardous debris (40 CFR 268.45).

11.3.3.4 Process Tanks, Internal Piping, and Ancillary Equipment

After the waste inventory is transferred from the 219-S Waste Handling Facility, the tanks and piping will meet the performance standard from Section 11.2.2 to be considered clean closed. Process equipment contained in the sample gallery, pipe gallery, and vault of the 219-S Waste Handling Facility is assumed to be contaminated or potentially contaminated. Equipment in these areas either has been in contact with the waste or has been in close proximity to the waste. All major equipment used in these areas is listed in Chapter 4.0 and will be removed from the 219-S Waste Handling Facility for disposal.

The process piping in the 219-S Waste Handling Facility will be removed in two stages. During the first stage, the process pipe jumpers will be removed; during the second stage, the hard piping will be removed. Some of the hard piping may be left in place after this process and removed with the associated tanks. The piping removed will be designated and packaged for transport to an appropriate TSD unit for further decontamination, as necessary, and disposal. Piping embedded within the concrete walls of the structure will be left in place until removal of the concrete and then examined, as possible, for a clean debris surface.

The process tanks in the 219-S Waste Handling Facility will be removed in two stages. The smaller pieces of equipment will be removed first, and the tanks will be removed second. The removal of each piece of equipment will be conducted under specific procedures prepared before closure.

11.3.3.5 External Piping and Ancillary Equipment

The pipes between the 219-S Waste Handling Facility and the 222-S Laboratory are included in this closure plan. In addition, abandoned piping encased in concrete between the 219-S Waste Handling Facility and the 222-S Laboratory used for TSD activities will be handled according to this closure plan. Abandoned transfer piping leading from the 219-S Waste Handling Facility tanks to the unit boundary (Section 4.1.2) will be closed in accordance with this closure plan. This piping will be excavated, designated, and disposed of at an appropriate TSD facility. Piping beyond the unit boundary (i.e., piping between the exterior wall of the 219-S Waste handling Facility and the 241-SY tank farm) is outside the scope of this closure plan. This piping is identified as part of the DST System boundary and will be addressed with the DST System closure. Pipeline corridor sampling of soil around external piping is discussed in Section 11.3.3.8.13.

11.3.3.6 Below-grade Concrete Vault Structure

The liners were installed from 1996 through 1998. The liners provide secondary containment for the tanks, process piping, and ancillary equipment in the concrete vault. The liners will be decontaminated, as necessary, before removal to meet the performance standards for metal in Section 11.2.2.1. All accessible concrete will be inspected visually before any decontamination. The purpose of the inspection will be to identify and map any cracks in the concrete that might have allowed contaminants a pathway to the soil below and to identify areas that potentially are contaminated with mixed waste or mixed waste residues.

Those potentially contaminated areas will undergo decontamination to meet the clean closure standard described in Section 11.2.2. Decontamination residues will be collected, designated, and managed as appropriate. Achievement of a clean debris surface for metal surfaces and clean surfaces for concrete surfaces will be documented on an inspection record.

11.3.3.7 Underlying Soil

The purpose of the soil sampling effort will be to verify that no contamination of the soil occurred or to determine the extent of contamination as a result of the operation of the 219-S Waste Handling Facility.

A sampling and analysis plan will be prepared in accordance with Section 11.3.3.8, before performing any soil sampling activities. A data evaluation report will be prepared after completion of the soil sampling activities and receipt of validated analytical results. This data evaluation report will compare the analytical results of the soil samples with the regulatory cleanup levels defined by the Hanford Facility RCRA Permit (DW Portion), Condition II.K [regulatory cleanup levels are based on WAC 173-303-610(2)(b). This comparison will serve as the basis for a decision on whether or not clean closure could be achieved.

If sample results from a specific area do not meet the clean closure criteria, the COC that exceed the regulatory cleanup levels will be identified. If further sampling is performed at this location, analysis will be limited to only these constituents. If the area of contamination is localized and accessible, the contaminated soil will be remediated or removed. Remediation or removal of soil will be followed by additional verification sampling to determine the effectiveness of the remediation or removal. The number of samples collected will depend on the areal extent of contamination encountered. If soil testing results are greater than regulatory cleanup levels stated (Condition II.K), the concrete will be removed as debris and the soil will be remediated.

11.3.3.8 Sampling to Achieve Clean Closure

In accordance with WAC 173-303-610(3)(a)(v), a sampling and analysis plan (SAP) will be developed in accordance with WAC 173-303, the Hanford Facility RCRA permit (Condition II.E), Ecology 2005, and/or the most current regulation. This plan will be submitted to Ecology for review and approval prior to implementation of this closure plan

The closure SAP will be designed to determine the probable maximum horizontal and vertical extent of contamination at and from the 222-S TSD unit. At the end of the closure process, additional sampling may be required to confirm that clean closure levels have been achieved.

The 222-S Closure SAP will include the following sections:

- A statement of the purpose and objectives of the data collection
- Organization and responsibilities for the sampling and analysis activities
- Project schedule
- General information on selection of types of samples needed (such as grab or composite), and amount of samples to be analyzed
- General information on selection of sampling locations and method used to determine where the sampling will occur
- Specific sampling approach and methods
- Sampling and analysis procedures to confirm decontamination of tanks and concrete containment systems and other media or equipment (if required)
- Procedures for analysis of samples and reporting of results.

Sections 11.3.3.8.1 through 11.3.3.8.4 describe the general approach to sampling to determine if the clean closure standard has been achieved. These approaches will be specified within the 222-S closure SAP.

11.3.3.8.1 Sampling Soil Under Concrete and Asphalt

All concrete surface areas will be inspected visually to identify cracked areas and other areas of potential contamination. Cracked areas will be mapped, and sampling in these areas will be biased to include the soil beneath cracked areas. If the below-grade concrete vault structure is left in place, the concrete will be cored and samples of the underlying soil will be collected for testing of COC. In addition to soil under cracked areas, any potential migration pathway through the concrete and liner, such as seams and expansion joints, will be taken into consideration when determining the exact soil sample locations.

Asphalt will be removed and soil underneath will be sampled, designated, and managed accordingly.

11.3.3.8.2 Sampling Soil Around Structure

The soil surrounding the 219-S Waste Handling Facility is relatively porous as is most of the soil on the Hanford Facility. However, if contaminants are present, the contaminants are unlikely to move substantially below the soil surface because average annual precipitation is low [approximately 15.9 centimeters per year (DOE/RL-91-28)]. No liquid discharge has occurred in the vicinity of the 219-S Waste Handling Facility. Thus, it is assumed that any contaminants released to the soil likely would not migrate down through the soil column but rather would be held in the upper soil profile. If indications of liquid discharges are identified, an SAP will be developed based on the data quality objectives process.

11.3.3.8.3 Sampling Soil Around the External Piping

In conjunction with piping removal, the excavated soil and pipe trench will be sampled and tested for contamination by COC. Soil sampling is expected to occur along the length of the pipe corridor trenches. Sampling might include both random and authoritative sampling. The deepest parts of the trenches, as well as concrete joints, are assumed to be the areas that would have the highest level of contamination. Therefore, soil in the bottom of the excavated pipe trench will be sampled during the soil sampling effort.

11.3.3.8.4 Quality Assurance

During closure activities, samples will be collected and analyzed in accordance with quality assurance and quality control guidelines contained in the HFFACO Action Plan (sections 6.5 and 9.6) and the Hanford Facility RCRA Permit to ensure representative and reliable results. The validity of both sampling and laboratory analytical methods will be ensured so the data from sampling activities can be used to accurately assess the presence or absence of contamination at the units.

Field duplicate, equipment blank, and trip blank samples will be analyzed as a check on field sampling methods, cross-contamination of samples, contamination from sample handling, and laboratory contamination. Analytical methods will be standard methods (e.g., SW-846) whenever possible and will include analysis of check standards, duplicate samples, spike samples, and method blanks. The results of the sampling and analysis program will be subjected to statistical analyses.

11.3.4 Closure Activities for the 222-S Dangerous and Mixed Waste Storage Area [I-1b(3)]

Closure of the 222-S DMWSA will require removal of all waste inventory, decontamination or removal of the storage structures, the concrete pad, and closure or removal of the underlying soil. In accordance with WAC 173-303-630(10), all dangerous waste and dangerous waste residues will be removed from the containment system. Remaining containers, liners, bases, and soil containing or contaminated with dangerous waste or dangerous waste residues will be decontaminated or removed.

11.3.4.1 Removing Dangerous Waste [I-1b(2)]

As a first step of closure, all containers of waste will be removed from the storage structures. The containers of waste will be transferred to an appropriate TSD unit.

11.3.4.2 Decontamination of the Structure

Clean closure of the 222-S DMWSA will require that the storage structures meet the clean closure performance standard in Section 11.2.2 and be removed to allow assessment of the concrete and underlying soil in accordance with Sections 11.2.2.2 and 11.2.2.4, respectively.

11.3.4.3 Concrete Pad

After removal of the storage structures, the concrete will be evaluated in accordance with Section 11.2.2.2. The purpose of the inspection will be to identify and map any cracks in the concrete that may have allowed contaminants a pathway to the soil and to identify areas that potentially are contaminated with dangerous waste or dangerous waste residues. The inspection will be documented on an inspection record. This process will be repeated at the previous 222-S DMWSA location.

11.3.4.4 Underlying Soil

If based on evaluation of the concrete pad, there is a possibility of contamination of the underlying soil, the soil will be sampled. The purpose of the soil sampling effort will be to verify that no contamination occurred as a result of operations. Soil sampling will occur after removal of the concrete pad.

An SAP will be prepared in accordance with SW-846 standards before performing any soil sampling activities. A data evaluation report will be prepared after completion of the soil sampling activities and receipt of validated analytical results in accordance with the 222-S closure SAP. This data evaluation report will compare the analytical results of the soil samples with the regulatory cleanup levels defined by the Hanford Facility RCRA Permit (DW Portion), Condition II.K. This comparison will serve as the basis for a decision on whether or not clean closure can be achieved.

If sample results from a specific area do not meet the clean closure criteria, the COC that exceed the regulatory cleanup levels will be identified. If further sampling is performed at this location, analysis will be limited to COC exceeding cleanup levels. If the contamination is localized and accessible, the contaminated soil will be remediated or removed. Remediation or removal of soil will be followed by additional verification sampling to determine the effectiveness of the remediation or removal.

11.3.5 Closure Activities for Room 2-B and Room 4-E Storage Areas [I-1b(3)]

Closure of Room 2-B and Room 4-E will be performed in accordance with WAC 173-303-630(10) and requires removal of all waste inventory, removal of equipment associated with waste management activities, and decontamination of the room. As a first step of closure, all containers of waste will be removed from the storage area. The containers of waste will be transferred to an appropriate TSD unit.

After removal of any waste and equipment associated with waste management activities, visual assessment of the room will be performed. Room surfaces will be evaluated in accordance with Sections 11.2.2.2 and 11.2.2.4.

Clean closure of the soil underlying Room 2-B or Room 4-E will be accomplished by demonstrating that there are no pathways for dangerous and/or mixed waste to the underlying soil. All liquid mixed waste stored in Room 2-B is stored in secondary containment, which prevents spills from reaching the floor. Room 2-B is located partly above a tunnel in the basement of the 222-S Laboratory Complex. Mixed waste stored in Room 4-E is stored in secondary containment when the waste contains free liquids, is ignitable, or is reactive. All concrete surface areas will be inspected visually to identify cracked areas and other areas of potential contamination. Cracked areas will be mapped, and sampling in these areas will be biased to include the soil beneath cracked areas. If the below-grade concrete vault structure is left in place, the concrete will be cored, and samples of the underlying soil will be collected for testing of COC. In addition to soil under cracked areas, any potential migration pathway through the concrete and liner, such as seams and expansion joints, will be taken into consideration when determining the exact soil sample locations. The ceiling of the basement room will be checked for staining that may indicate a leak of dangerous and/or mixed waste occurred.

11.4 MAXIMUM WASTE INVENTORY [I-1c]

The maximum inventories for the treatment/and or storage units of the 222-S Laboratory Complex are based on information contained in Chapter 1.0.

11.5 SCHEDULE FOR CLOSURE [I-1f]

Closure of 222-S Laboratory Complex is not anticipated to occur within the next 15 to 20 years. Because use of the 222-S Laboratory is required for environmental restoration activities, a date for closure of the 219-S Waste Handling Facility, the 222-S DMWSA, and Rooms 2-B and 4-E storage areas depends on the schedule for these activities. Other factors affecting the year of closure include changes in operational requirements and unforeseen factors. When a definite closure date is established, a revised closure plan will be submitted to Ecology. The activities required to complete closure are planned to be accomplished within 180 days in accordance with WAC 173-303-640(4)(c). Should a modified schedule be necessary, a revised schedule will be presented and agreed to before closure in accordance with WAC 173-303-640(4)(b).

11.6 CERTIFICATION OF CLOSURE.

In accordance with WAC 173-303-610(6), within 60 days of completion of closure of the 222-S TSD unit (including tank systems and container storage areas), and within 60 days of the completion of final closure, the owner or operator will submit to Ecology by registered mail, a certification that the 222-S TSD unit has been closed in accordance with the specifications in the approved closure plan. The certification must be signed by the owner or operator and by an independent registered professional engineer. Documentation supporting the independent registered professional engineer's certification must be furnished to Ecology on request.

Chapter 12.0

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12.0 REPORTING AND RECORDKEEPING

The 222-S TSD unit is subject to the reporting and recordkeeping requirements of WAC 173-303. Descriptions of specific reporting and recordkeeping requirements applicable to the 222-S TSD unit are located in DOE/RL-91-28. Not all of the requirements and associated reports and records identified in Chapter 12.0 of the General Information Portion apply to the 222-S TSD unit. Those that apply are as follows:

Quarterly notification of Class 1 modification notification	Release or noncompliance not requiring immediate reporting
Certification of construction or modifications	Onsite transportation documentation
Anticipated noncompliance	Annual noncompliance report
Reporting planned changes	Annual dangerous waste report
Immediate reporting	Annual land disposal restriction report
Monitoring and records	Permit condition compliance evaluation
Written reporting	Deed notification (reference only)
Waste transfer documentation discrepancy report (equivalent to "Manifest Discrepancy Report")	Inspection records
Other information	Schedule extensions
Engineering change notices and nonconformance reports	Notification of, or request for, permit modification
Notification of permit-related documentation	Land disposal restriction records
Waste location	Permit-related documentation
Waste analysis	As-built drawings
Contingency plan and incident reports	Equivalent materials
Personnel training records	Waste minimization and pollution prevention
Closure and post-closure cost estimates	

The 222-S Operating Record 'records contact' name is kept on file in the General Information file of the Hanford Facility Operating Record (refer to DOE/RL-91-28, Chapter 12.0).

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Chapter 13.0

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13.0 OTHER FEDERAL AND STATE LAWS [J]

Federal, state, and local laws applicable to the 222-S Laboratory Complex are discussed in Chapter 13.0 of the General Information Portion (DOE/RL-91-28). Generally, the laws applicable to the 222-S Laboratory Complex include, but may not be limited to, the following:

Atomic Energy Act of 1954
Federal Facility Compliance Act of 1992
Clean Air Act of 1977
Safe Drinking Water Act of 1974
Emergency Planning and Community Right-to-Know Act of 1986
Toxic Substances Control Act of 1976
National Historic Preservation Act of 1966
Endangered Species Act of 1973
Fish and Wildlife Coordination Act of 1934
Federal Insecticide, Fungicide, and Rodenticide Act of 1975
Hazardous Materials Transportation Act of 1975
National Environmental Policy Act of 1969
Washington Clean Air Act of 1967
Washington Water Pollution Control Act of 1945
Washington Pesticide Control Act of 1971
Model Toxics Control Act
Benton Clean Air Authority Regulation 1
State Environmental Policy Act of 1971.

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Chapter 14.0

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14.0 CERTIFICATION [K]

The following certification, required by WAC 173-303-810(13), "Dangerous Waste Regulations," "General Permit Conditions," "Certification," for all applications and reports submitted to Ecology, is hereby included:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

9/18/06

Owner/Operator
Roy J. Schepens, Manager
U.S. Department of Energy,
Office of River Protection

Date

Dennis Ferm for Mark Spears

8/30/06

Co-Operator
Mark S. Spears
President and General Manager
CH2M HILL Hanford Group, Inc.

Date

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Chapter 15.0

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15.0 REFERENCES

40 CFR 178, "Objections and Requests for Hearings," *Code of Federal Regulations*, as amended.

40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities," *Code of Federal Regulations*, as amended.

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UBC, 1994, *Uniform Building Code*, International Conference of Building Officials, Whittier, California.

UBC, 1949, *Uniform Building Code*, International Conference of Building Officials, Whittier, California.

WAC-173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WHC-SD-CP-ER-030, 1990, *219-S Aqueous Waste Disposal Facility Tank System Integrity Assessment Report*, Westinghouse Hanford Company, Richland, Washington.

APPENDIXES

Appendix 3A

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Figures 1-1 and 1-2 of Waste Analysis Plan for the 222-S Dangerous And Mixed Waste Treatment, Storage, and Disposal Unit have been removed because they are designated Official Use Only

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CONTENTS

FIGURES

TABLES

ACRONYMS

ALARA	as low as reasonably achievable
CFR	Code of Federal Regulations
Coliwasa	composite liquid waste sampler
DMWSA	Dangerous and Mixed Waste Storage Area
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DST	double-shell tank
Ecology	State of Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
LDR	land disposal restriction
PCB	polychlorinated biphenyls
QA	quality assurance
QC	quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
TSD	Dangerous and Mixed Waste Treatment, Storage, and Disposal
WAC	Washington Administrative Code
WAP	waste analysis plan

METRIC CONVERSION CHART

Into metric units | Out of metric units

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	millimeters	millimeters	0.03937	inches
inches	2.54	centimeters	centimeters	0.393701	inches
feet	0.3048	meters	meters	3.28084	feet
yards	0.9144	meters	meters	1.0936	yards
miles (statute)	1.60934	kilometers	kilometers	0.62137	miles (statute)
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.09290304	square meters	square meters	10.7639	square feet
square yards	0.8361274	square meters	square meters	1.19599	square yards
square miles	2.59	square kilometers	square kilometers	0.386102	square miles
acres	0.404687	hectares	hectares	2.47104	acres
Mass (weight)			**Mass (weight)**		
ounces (avoir)	28.34952	grams	grams	0.035274	ounces (avoir)
pounds	0.45359237	kilograms	kilograms	2.204623	pounds (avoir)
tons (short)	0.9071847	tons (metric)	tons (metric)	1.1023	tons (short)
Volume			**Volume**		
ounces (U.S., liquid)	29.57353	milliliters	milliliters	0.033814	ounces (U.S., liquid)
quarts (U.S., liquid)	0.9463529	liters	liters	1.0567	quarts (U.S., liquid)
gallons (U.S., liquid)	3.7854	liters	liters	0.26417	gallons (U.S., liquid)
cubic feet	0.02831685	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.7645549	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy			**Energy**		
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.94782	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure			**Force/Pressure**		
pounds (force) per square inch	6.894757	kilopascals	kilopascals	0.14504	pounds per square inch

06/2001

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE, Third Ed., 1990, Professional Publications, Inc., Belmont, California.

1.0 UNIT DESCRIPTION

The purpose of this waste analysis plan (WAP) is to document the waste acceptance process, sampling methodologies, analytical techniques, and processes that are undertaken for sampling and analysis of dangerous and/or mixed waste managed in the 222-S Dangerous and Mixed Waste Treatment, Storage, and Disposal (TSD) unit. The 222-S Laboratory Complex (which includes the 222-S TSD unit) is located in the 200 West Area of the Hanford Facility, Richland, Washington (Figure 1-1).

Where information regarding treatment, management, and disposal of the radioactive source byproduct material and/or special nuclear components of mixed waste(as defined by the *Atomic Energy Act of 1954* as amended) is incorporated into this document, it is not incorporated for the purpose of regulating the radiation hazards of such components under the authority of this permit or Chapter 70.105, "Hazardous waste management," of the Revised Code of Washington and its implementing regulations but is provided for information purposes only.

1.1 DESCRIPTION OF UNIT PROCESSES AND ACTIVITIES

The 222-S Laboratory Complex describes the geographical boundary established in HNF-IP-0263-222-S, *Building Emergency Plan for the 222-S Laboratory Complex.* The 222-S Laboratory Complex contains analytical laboratories, maintenance areas, operations areas, administrative buildings, and the 222-S TSD unit. The 222-S TSD unit is comprised of four TSD components: 219-S Waste Handling Facility, Dangerous Mixed Waste Storage Area (DMWSA), Room 4-E, and portions of Room 2-B (Chapter 4, DOE/RL-91-27).

Mixed waste is managed in each of the 222-S TSD components. Dangerous waste is managed only in the 222-S DMWSA.

The 219-S Waste Handling System, which is comprised of the 219-S Tank System, is located northeast of the 222-S Laboratory (Figure 1-2). The 219-S Tank System includes tanks 101, 102, and 104 and all associated ancillary equipment (Table 4-2, DOE/RL-91-27). The 219-S Tank System accepts mixed waste for treatment and storage as well as radioactive waste for storage. Mixed and radioactive waste can be introduced into the 219-S Tank System from Room 2-B hood 16 sinks, hot cell drains within the 222-S Laboratory, piping connected from analytical instrumentation within the 222-S Laboratory, and various-sized containers pumped (e.g., tanker trucks, 208-liter drums) directly into one of the tanks. Mixed waste is aggregated in the tanks and prepared for transfer to another onsite treatment, TSD unit, or offsite TSD facility. Acceptance criteria established in this WAP is designed to allow transfer of the mixed waste to the Double-Shell Tank (DST) System, an onsite TSD unit. The waste numbers appearing on the 222-S TSD unit Part A Form for the 219-S Tank System are based on the waste numbers contained on the Part A Form for the DST System (see DOE/RL-90-39, *Hanford Facility Dangerous Waste Permit Application, Double-Shell Tank System,* Rev. 1, Chapter 1).

After aggregation of mixed and/or radioactive waste in the tanks of the 219-S Tank System, the batch of mixed waste proposed for transfer is isolated from other mixed waste in the tank system.

For transfers into the DST System, a sample is acquired before and after treatment. Sampling and analysis results from the sample acquired before treatment will determine the amount of sodium hydroxide (NaOH) and sodium nitrite ($NaNO_2$) that will be added to the isolated batch of mixed waste. Addition of these chemicals makes the mixed waste more amenable for storage in the DST System. A sample is acquired from the treated waste to ensure that the waste meets the DST waste acceptance criteria. Table 3-2 provides the parameter list and the rationale for selecting the parameters used for waste acceptance.

For all transfers out of the 219-S Tank System, a sample is acquired from the mixed waste to determine whether the mixed waste displays the characteristics of corrosivity (D002) and heavy metals (D004-D011). Sampling and analysis frequencies to determine whether the mixed waste contains underlying hazardous constituents are discussed in Section 7.3. Furthermore, 222-S Laboratory Complex management will determine on a case-by-case basis whether sampling and analysis results are needed for other parameters [e.g., organic constituents (D018-D043)]. This determination is based on the ultimate destination of the waste (i.e., if the waste is being transferred offsite, additional sampling and analysis may be required to meet the receiving unit's waste acceptance criteria.). A more detailed description of the 219-S Tank System is provided in Chapter 4.0 of DOE/RL-91-27, Rev. 2.

The 222-S DMWSA is located north of the 222-S Laboratory (Figure 1-2) and consists of two metal storage structures. The 222-S DMWSA provides container storage of dangerous, mixed, and/or radioactive waste. The containers are stored until transfer to an onsite TSD unit, an offsite TSD facility, Room 2-B, or Room 4-E. Waste management activities occurring in the 222-S DMWSA include packaging, repackaging, and sampling. 222-S Laboratory Complex management will determine on a case-by-case basis whether a sample is acquired from dangerous and/or mixed waste stored in the 222-S DMWSA. Sampling and analysis results can be obtained to ensure waste acceptance criteria is met for subsequent transfers/shipments, to complete physical/chemical screening requirements, or to perform characterization. The waste numbers appearing on the 222-S TSD unit Part A Form for the 222-S DMWSA are based on calibration standards formulated for a large variety of analytes for which 222-S Laboratory may perform analyses. A more detailed discussion of the 222-S DMWSA is provided in Chapter 4.0 of DOE/RL-91-27, Rev. 2.

Room 2-B and Room 4-E are located within the 222-S Laboratory (Figure 1-2). The Room 2-B waste container storage TSD component is a portion of Room 2-B. The Room 4-E container storage TSD component comprises the entire Room 4-E unless otherwise identified. Room 2-B and Room 4-E provide container storage of mixed and/or radioactive waste. The containers are stored until transfer to the 219-S tank system, the 222-S DMWSA, an onsite TSD unit, or an offsite TSD facility. Containers also are transferred between the *Resource Conservation and Recovery Act of 1976* (RCRA) permitted portions of Room 2-B and Room 4-E (see Figure 1-2). Waste management activities occurring in Room 2-B and Room 4-E include packaging, repackaging, and sampling. 222-S Laboratory Complex management will determine on a case-by-case basis whether a sample is acquired from waste stored in Room 2-B or Room 4-E. This determination is based on the ultimate destination of the waste (i.e., if the waste is being transferred offsite, additional sampling and analysis may be required to meet the receiving units waste acceptance criteria). A detailed description of the 219-S Tank System is provided in

Chapter 4.0 of DOE/RL-91-27, Rev. 2. Sampling and analysis results can be obtained to ensure waste acceptance criteria have been met for subsequent transfers/shipments, to complete physical/chemical screening requirements, or to perform characterization. The waste numbers appearing on the 222-S TSD unit Part A Form for Room 2-B and Room 4-E are based on a large variety of standards used to calibrate equipment for analysis.. A more detailed discussion of Room 2-B and Room 4-E is provided in Chapter 4.0 of DOE/RL-91-27, Rev. 2.

1.2 IDENTIFICATION, CLASSIFICATION, AND QUANTITIES OF WASTE MANAGED WITHIN THE 222-S LABORATORY TREATMENT, STORAGE, AND DISPOSAL UNIT

The dangerous and/or mixed waste managed at the 222-S TSD units is received from waste generated within the 222-S Laboratory Complex, from waste generated at other Hanford Site locations (off-unit), and from waste generated offsite (Appendix 3B of DOE/RL-91-27). The following general sources describe the types of dangerous and/or mixed waste managed in the 222-S TSD units:

a. Waste generated within the 222-S Laboratory Complex.
    1. Analytical waste resulting from sample analysis.
    2. Discarded chemical products from laboratory reagents/standards.
    3. Waste from chemicals synthesized or created during research activities.
    4. Unused samples.
    5. Maintenance/construction project waste.

b. Off-unit/offsite[1] waste.

Each of these general sources of waste is discussed in the following sections.

In addition, the following waste is prohibited from management in the 222-S Laboratory TSD container storage units (222-S DMWSA, Room 2-B, and Room 4-E):

a. Dangerous and/or mixed waste not identified on the Part A Form.

b. Reactive waste defined in *Washington Administrative Code* (WAC), "Dangerous Waste Regulations," 173-303-090(7)(a)(vi), (vii), and (viii).

The following waste is prohibited from management in the 219-S Tank System:

a. Dangerous and/or mixed waste not identified on the Part A Form.
b. Reactive waste defined in WAC 173-303-090(7)(a)(vi), (vii), and (viii).
c. Organic compounds not miscible with water forming a separable layer.
d. Waste likely to precipitate to the extent drain lines will clog.

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[1] *Settlement Agreement re: Washington v. Bodman*, Civil No. 2:03-cv-05018-AAM, U.S. Department of Energy and Washington State Department of Ecology, dated January 6, 2006. (See DOE/RL-91-27, Rev. 2, Appendix 3B.)

1.2.1 Waste Generated within the 222-S Laboratory Complex

Waste generated within the 222-S Laboratory Complex includes analytical waste resulting from sample analysis, discarded chemical products from laboratory reagents/standards, waste from chemicals synthesized or created during research activities, unused samples, and maintenance/construction project waste.

1.2.1.1 Analytical Waste Resulting from Sample Analysis

Analytical waste resulting from sample analysis constitutes the largest volume of waste to be stored. Liquid and non-liquid waste forms, as well as aqueous and non-aqueous wastes, are generated from laboratory activities. Analytical waste resulting from sample analysis can include, but is not limited to, waste generated from performing work under the sample exclusion in WAC 173-303-071(3)(l), or the treatability study exclusions in WAC 173-303-071(3)(r), and (s).

Analytical waste resulting from sample analysis contains chemical reagents used in the laboratory procedures and a contribution from the sample. The management of analytical wastes begins before any waste is generated by pre-designation of laboratory waste streams having consistent characteristics such as process analytical waste streams are based on the following two considerations:

a. Reagents used in the laboratory procedure.
b. Contributions from calibration, verification standards or Method Standard used during an analytical process or procedure.

Sample contribution is captured by reviewing sample characteristics, listed waste numbers, and origin identified on documentation accompanying incoming samples to the 222-S Laboratory.

The documented information is evaluated by 222-S Laboratory chemists and subject matter experts (management and/or environmental personnel) as part of the 222-S Laboratory procedure issuance process or test plan development. The evaluation will consist of the following elements:

a. Estimate chemical constituents as worst case (i.e., highest concentration).
b. A compatibility review to evaluate potential reactions and other hazards for chemicals used in the procedure or test plan using standard chemistry references.
c. Review of applicable waste codes against the TSD unit Part A permit to determine if the mixed waste is prohibited.

After a 222-S Laboratory procedure or test plan is issued, the waste is generated. Information on waste in any given container is evaluated by 222-S Laboratory waste management personnel to determine listed waste numbers for samples that were tested. The waste designation is complete after sample contribution for listed waste numbers is considered. This waste designation approach results in a determination whether analytical waste resulting from samples can be introduced into the 219-S Tank System or must be packaged for transfer/shipment in containers. This approach establishes acceptable knowledge for analytical waste resulting from samples.

1.2.1.2 Discarded Chemical Products from Laboratory Reagents/Standards

Typically, only a few of these dangerous and/or mixed waste numbers are generated at any one time. The Part A Form for the container storage units lists all of the waste numbers because of the potential for a wide variety of research activities within the 222-S Laboratory Complex. This dangerous and/or mixed waste is in the original container or can be traced back to the original reagent/standard container. Information on the container label and logbooks is used to establish acceptable knowledge.

1.2.1.3 Waste from Treatability Studies and Research Activities

Waste from treatability studies and research activities typically is generated in small quantities ranging from a few grams to a few liters. These waste types consist primarily of radiologically contaminated chemicals, such as organics and treatment products from treatability studies. Waste from treatability studies and research activities will be managed in the same manner as analytical waste resulting from samples (Section 1.2.1.1).

1.2.1.4 Unused samples

Unused samples are either returned to the generator in accordance with the sample exclusion in WAC 173-303-071(3)(l) or the treatability study exclusion in WAC 173-303-071(3)(r) and (s), or declared as waste. If declared as waste, 222-S Laboratory Complex waste management personnel will review all information on the unused samples to determine if acceptable knowledge exists to perform a waste designation. Acceptable knowledge may include the following:

a. Sampling and analysis results from 222-S Laboratory activities.
b. Listed waste numbers identified on documentation accompanying incoming samples to the 222-S Laboratory.

The waste designation and the 219-S waste acceptance criteria will determine whether unused samples can be introduced into the 219-S Tank System or must be packaged in containers.

1.2.1.5 Maintenance/Construction Project Waste

Maintenance/construction project waste is generated based on the need for such activities within the 222-S Laboratory Complex. Maintenance waste is typically generated from activities taking place on the 219-S Tank System, the 222-S Laboratory ventilation system, and 222-S Laboratory hoods. Construction project waste can result from upgrades or renovations within the 222-S Laboratory Complex. Maintenance/construction project waste is primarily debris. Debris may be hazardous debris from maintenance of the 219-S Tank System. Chemicals are evaluated when used in the maintenance/construction project activities work planning process. Nonhazardous chemicals are substituted whenever possible. Hazardous chemicals are considered in the designation of debris. This approach establishes acceptable knowledge for maintenance/construction project waste.

1.2.2 Off-Unit/Offsite Waste

Off-unit/offsite (Appendix 3B) waste managed within the 222-S TSD includes dangerous and mixed wastes. Acceptable knowledge is obtained during the confirmation process for off-unit/offsite waste (Section 2.0).

Rooms 2-B and 4-E receive containerized mixed waste. The DMWSA receives containerized dangerous and mixed wastes.

The 219-S Tank System is not configured to directly accept containerized waste. Waste is introduced to the 219-S Tank System through Hood 16 sinks in Room 2-B and the hot cell drains. Containerized mixed waste destined for the 219-S Tank System is received and accepted into one of the other TSD units, Room 2-B, Room 4-E, or the DMWSA. Mixed wastes are then transferred to the 219-S Tank System.

1.3 OPERATING CONSTRAINTS

Operating constraints exist for the 222-S TSD unit and are related to the storage and/or treatment of the dangerous and/or mixed waste. Operating constraints related to the storage and/or treatment of dangerous and/or mixed waste are a subset of constraints required for operations at the 222-S TSD unit. The parameters identified in Section 3.0 of this WAP address operating constraints related to waste properties, processes, and regulatory requirements.

1.4 PROCESS FLOW DIAGRAM

Refer to Figures 1-3 through 1-6 for flow charts of waste management processes within the 222-S Laboratory Complex.

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APPENDIX 3A

WASTE ANALYSIS PLAN

FIGURE 1-1, 200 WEST AREA SITE PLAN

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APPENDIX 3A

WASTE ANALYSIS PLAN

FIGURE 1-2, 222-S LABORATORY COMPLEX DANGEROUS AND MIXED WASTED TSD UNIT COMPONENTS

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H0050073.72

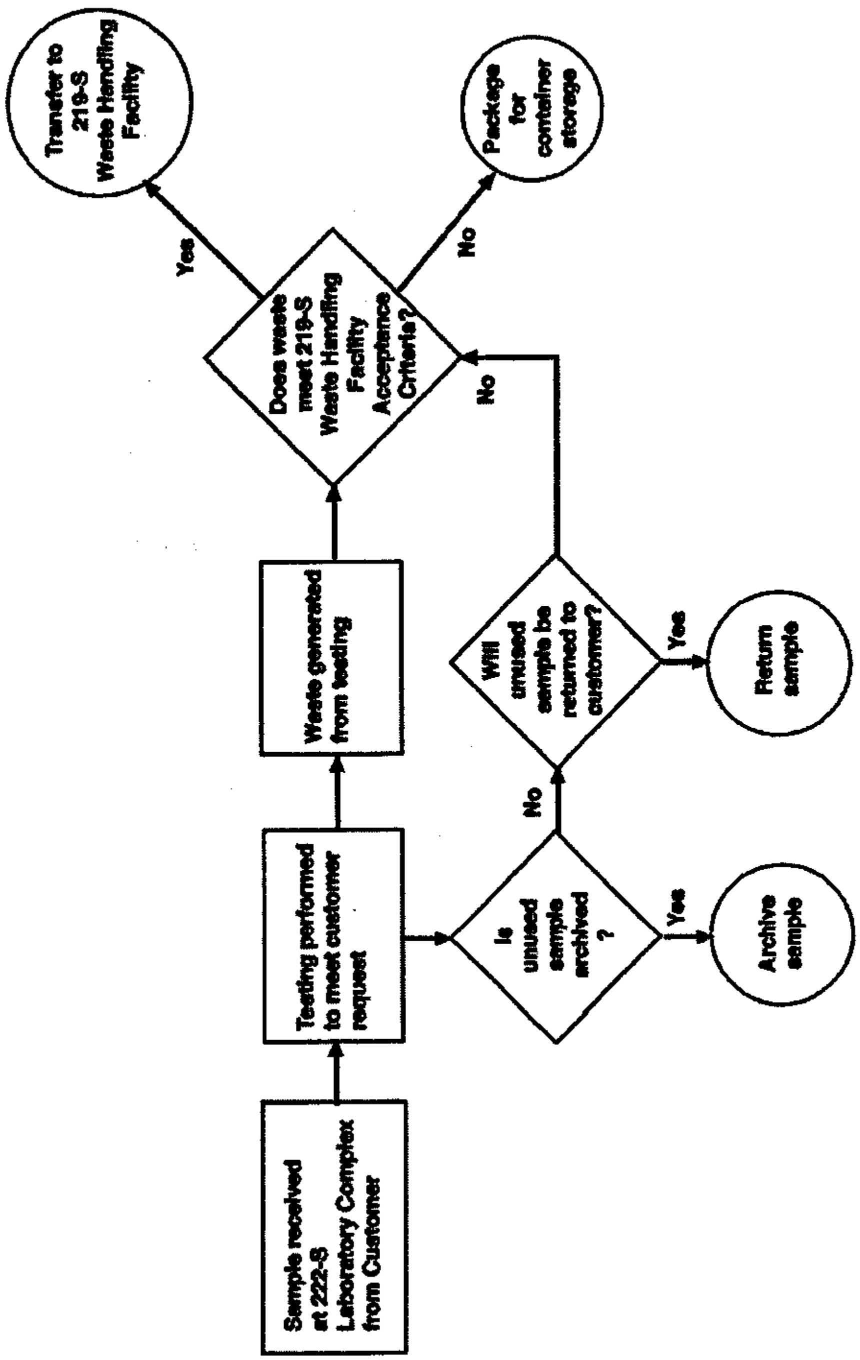

Figure 1-3. Sample Management.

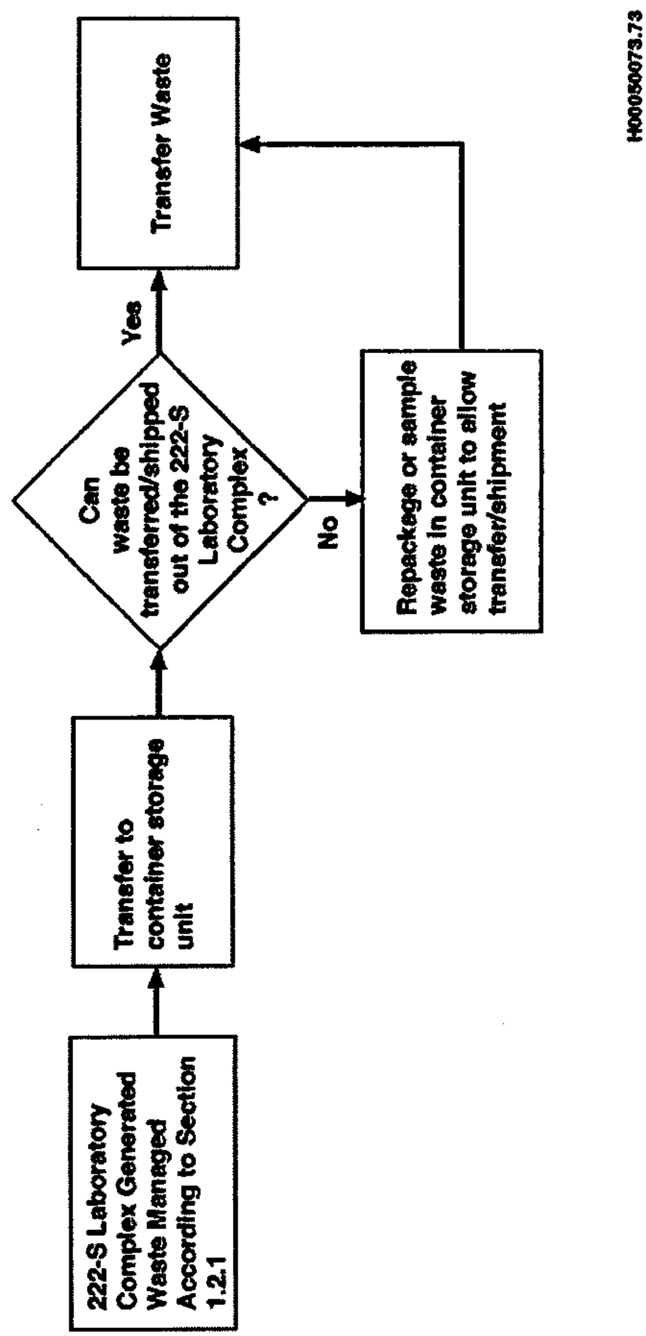

Figure 1-4. Container Storage Units.

Figure 1-5. 219-S Tank System - 222-S Laboratory Complex Generated Waste.

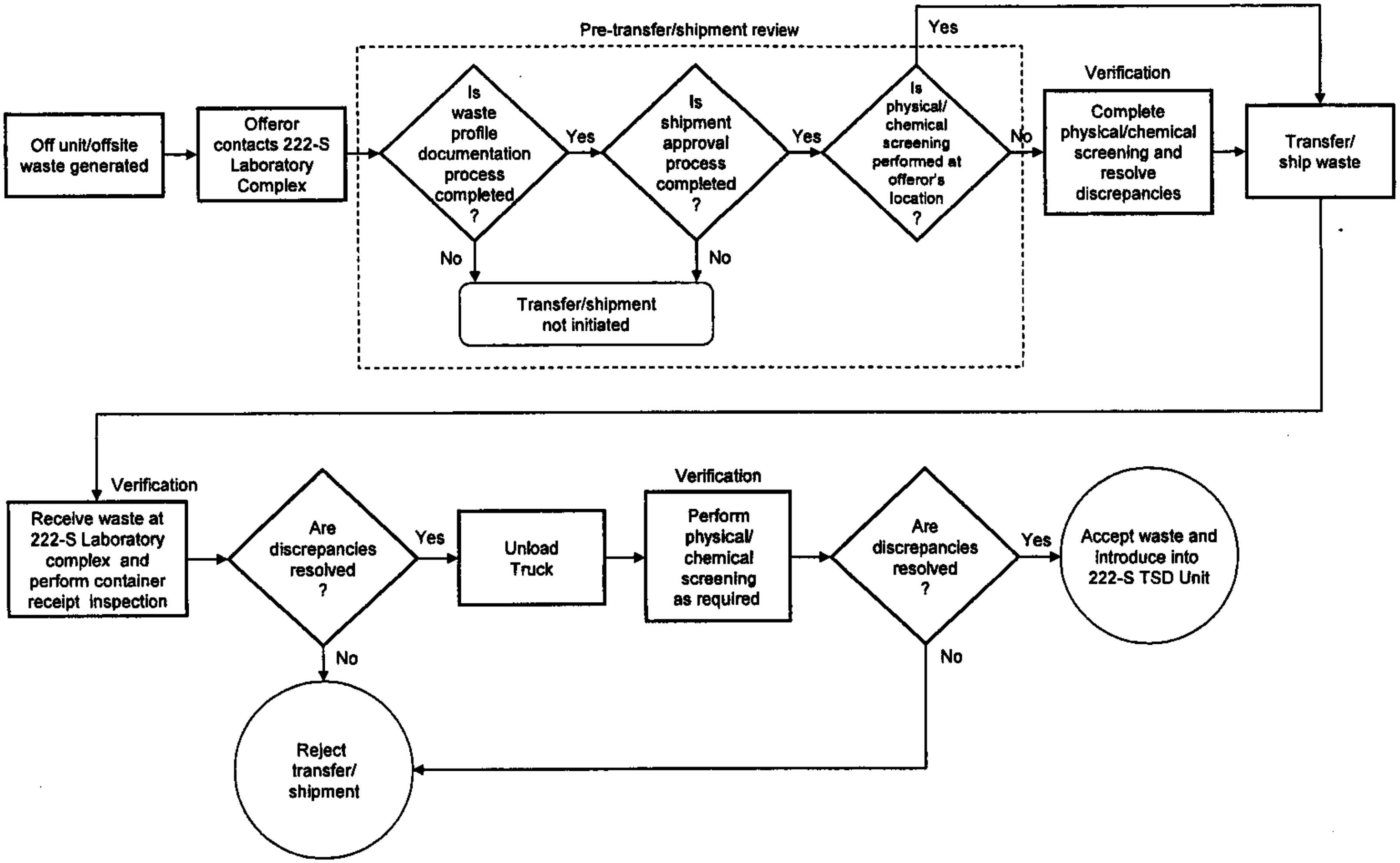

Figure 1-6. 219-S Tank System – Off-unit/Offsite Waste.

2.0 CONFIRMATION PROCESS

WAC 173-303-300(1) requires confirmation of dangerous and/or mixed waste before initial acceptance of waste to ensure the waste is managed properly. Confirmation occurs prior to transfer as part of the pre-transfer review for 222-S Laboratory Complex generated waste. Confirmation occurs prior to (pre-transfer/shipment review) and after transfer/shipment for off-unit/offsite waste. Confirmation activities will be performed in accordance with TSD-unit-specific governing documentation and in a consistent manner.

The confirmation process for the container storage units is different from the confirmation process for the 219-S Tank System. Enough differences exist to warrant separate processes for different types of waste management units. Confirmation is not required for transfer of waste between container storage units. When a transfer of waste occurs between container storage units, information has already been obtained on the mixed waste prior to entry into the container storage unit. In addition, the waste numbers on the Part A Form for the different container storage units are identical. As a result, the waste tracking system(s) need only to be updated to reflect the new location of the mixed waste and any new packaging configuration.

For transfers of mixed waste from a container storage unit into the 219-S Tank System, confirmation is necessary because the waste numbers contained on the Part A Form are different and waste can not be retrieved once introduced into the 219-S Tank System. The waste numbers for the 219-S Tank System are a subset of the waste numbers for the container storage unit(s) and therefore are more restrictive. The following items must be satisfied prior to transfer of mixed waste from a container storage unit into the 219-S Tank System:

a. A complete waste designation must be performed in accordance with management practices described in Section 1.2.1 to determine compliance with the Part A Form and to determine if the mixed waste is a prohibited waste.

b. Information must address compatibility of the mixed waste to the waste stored in the 219-S Tank System (Section 7.2).

c. Authorization for each container of mixed waste must exist for waste to be introduced into the 219-S Tank System.

d. Following transfer of the mixed waste, the information regarding the waste must be transferred to the waste tracking system for the 219-S Tank System. Information in the tracking system must contain or be traceable to the volume content of the waste.

The confirmation process consists of two parts: pre-transfer/shipment review and container receipt inspection. Section 2.1 discusses the processes for 222-S Laboratory Complex generated waste. Sections 2.2 and 2.3 discuss the processes for off-unit/offsite waste.

2.1 PRE-TRANSFER REVIEW FOR 222-S LABORATORY COMPLEX GENERATED WASTE

222-S Laboratory Complex generated waste is managed in accordance with Section 1.2.1. As a result, confirmation processes of 222-S Laboratory Complex generated waste only include a pre-transfer review. If the 222-S Laboratory Complex generated waste is not managed in accordance with Section 1.2.1, the waste is subjected to container receipt inspection (Section 2.3.1) and physical/chemical screening (Section 2.3.2) requirements.

2.1.1 Container Storage Unit

When dangerous and/or mixed waste is managed in accordance with Section 1.2.1, acceptable knowledge is obtained on the waste to ensure the waste is managed properly for storage. Management practices in Section 1.2.1 establish whether the dangerous and/or mixed waste is a prohibited waste or whether the waste is ignitable, reactive, or incompatible. Available information regarding LDR (Section 7.3) is entered into a waste tracking system used to meet operating record requirements. If characterization information obtained prior to storage is not sufficient to address characterization parameters for subsequent treatment and/or disposal, sampling and analysis is performed on the waste for the needed parameters after acceptance.

2.1.2 219-S Tank System

222-S Laboratory Complex generated waste can be introduced into the 219-S Tank System: as generated, from a satellite accumulation area container, from a 90-day accumulation area container, or from a container storage unit container. A transfer from a container storage unit container is addressed in Section 2.0. For the remaining three scenarios, the following items must be satisfied prior to transfer of mixed waste into the 219-S Tank System:

a. A complete waste designation must be performed in accordance with management practices of Section 1.2.1 to determine compliance with the Part A Form and to determine if the mixed waste is a prohibited waste.

b. Information must address compatibility of the mixed waste to the waste stored in the 219-S Tank System (Section 7.2).

c. Authorization for each container of mixed waste must exist for waste to be introduced into the 219-S Tank System.

d. Following transfer of the mixed waste, the information regarding the waste must be transferred to the waste tracking system for the 219-S Tank System, and the quantity of waste introduced is estimated and recorded (except for instrumentation waste, Section 2.1.2.2).

2.1.2.1 Hood 16 in Room 2-B

Management practices in Section 1.2.1 establish whether the mixed waste is a prohibited waste or whether the waste is ignitable, reactive, or incompatible. Hood 16 associated sinks are located within the physical boundaries of Room 2-B container storage TSD component. Hood 16 activities include introducing waste into the 219-S Tank System and cleaning laboratory equipment. Hood 16 and the associated sinks serve as an entry point into the 219-S Tank System TSD component. The 219-S TSD component begins where the piping joins to the Hood 16 sink drains. The sinks are flushed after waste additions to ensure no waste remains in the sink. In addition to the requirements of Section 2.1.2, adequate flush volumes are estimated and recorded.

2.1.2.2 Hard-Piped Laboratory Instrumentation

Management practices in Section 1.2.1 establish whether the mixed waste is a prohibited waste or whether the waste is ignitable, reactive, or incompatible. Section 2.1.2 contains all the requirements for hard-piped laboratory instrumentation waste introduction.

2.1.2.3 Hot Cell Drains

Management practices in Section 1.2.1 establish whether the mixed waste is a prohibited waste or whether the waste is ignitable, reactive, or incompatible. Hot cell housekeeping practices result in water wash downs of the interior surfaces of the hot cell and equipment contained in the hot cell. Mixed waste introduced into the 219-S Tank System through hot cell drains is waste generated in the hot cell and waste that can not be introduced through Hood 16 in Room 2-B due to as-low-as-reasonably-achievable (ALARA) reasons. Storage does not occur in 222-S Laboratory hot cells. In addition to the requirements of Section 2.1.2, adequate flush volumes are estimated and recorded. Hot cells are discussed in detail in Chapter 4.

2.2 PRE-TRANSFER/SHIPMENT REVIEW FOR OFF-UNIT/OFFSITE WASTE

The pre-transfer/shipment review is the process used by the 222-S Laboratory Complex designated waste acceptance organization to obtain and evaluate the generator's analysis of mixed waste to be received into the 222-S TSD unit and to document acceptable knowledge. The pre-transfer/shipment review consists of a waste profile documentation process and a transfer/shipment approval process. The pre-transfer/shipment review occurs before the waste is transferred/shipped. Off-unit waste will be received as a transfer unless *Hanford Facility RCRA Permit*, Dangerous Waste Portion (Ecology 1995), General Condition II.P.1 applies. Offsite waste will be received as a shipment in accordance with WAC 173-303-370 with the exception of mixed waste that must be introduced into the 219-S Tank System through hot cell drains due to radiological levels based on ALARA principles (refer to Section 2.3.2).

Minimum information required to receive waste into the 222-S TSD unit consists of information to meet characterization for storage requirements. This minimum information contains four elements: (1) ensure waste can be managed pursuant to the Part A Form, (2) ensure the waste is not a prohibited waste, (3) determine if the waste is an ignitable, reactive, or incompatible waste as defined in WAC 173-303-040, and (4) treatment and/or disposal characterization information when mixed waste is destined for the 219-S Tank System. If analysis of the characterization information leads to a conclusion that the waste is ignitable, reactive, or incompatible, acceptance of the waste into the 222-S TSD unit must be conducted pursuant to Section 7.2.

2.2.1 Waste Profile Documentation Process

During the waste profile documentation process, the Hanford organization generating mixed waste, the offsite generator, or Hanford Facility TSD unit personnel have the responsibility to provide relevant information pertaining to the proper management of the waste. Characterization information pertaining to the treatment and/or disposal of the mixed waste will be obtained during the waste profile documentation process when the mixed waste is destined for the 222-S TSD unit. Authorization for each container of mixed waste must exist for waste to be introduced into the 222-S TSD unit.

During the waste profile documentation process, the 222-S Laboratory Complex designated waste acceptance organization obtains the following information:

a. Description of waste generating process.
b. Characterization data.
c. Waste numbers.
d. LDR data.
e. Composition of waste including regulated constituents of concern.

The waste profile documentation process is described as follows:

a. Hanford organization generating mixed waste or offsite generator completes waste profile documentation. Hanford Facility TSD unit personnel obtain existing information on waste from operating record. These organizations are herein referred to as the offeror.
b. The 222-S Laboratory Complex designated waste acceptance organization reviews information towards the waste acceptance criteria for the entire waste management pathway within the 222-S TSD unit.
c. The 222-S Laboratory Complex designated waste acceptance organization requests additional information from the offeror to address discrepancies for either (1) inconsistent information or (2) information not constituting acceptable knowledge as defined by the Environmental Protection Agency (EPA) (OSWER 9938.4-03, PB94-963603, *Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes*, pages 1-11 and 1-12).
d. Information (waste profile documentation) is resubmitted by the offeror addressing concerns in item c.
e. If concerns are addressed, waste profile documentation is approved.
f. If concerns are not addressed, waste profile documentation is not approved.

2.2.2 Shipment Approval Process

After the offeror has received waste profile documentation approval, the offeror is subject to the shipment approval process. Only those containers approved under the waste profile documentation as part of the shipment approval process will be transferred/shipped to the

222-S TSD units. During the shipment approval process, the 222-S Laboratory Complex designated waste acceptance organization obtains the following information:

a. Number and type of containers.
b. Waste quantity.
c. Waste stream profile documentation.
d. General physical and chemical properties and composition of the waste if not contained within the waste profile documentation.

The shipment approval process is described as follows:

a. The offeror obtains information from existing database, operating record, or generator records on each container to be transferred/shipped under the approved waste profile documentation.
b. Information is submitted to the 222-S Laboratory Complex designated waste acceptance organization by the offeror and is reviewed for the following:
    1. Consistency with approved waste profile documentation.
    2. Acceptable knowledge review for a waste stream where characterization is incomplete on the waste profile documentation (e.g., labpacks).
    3. Consistency with waste acceptance criteria for the entire waste management pathway within the 222-S TSD units.
c. The 222-S Laboratory Complex designated waste acceptance organization requests additional information from the offeror to address any discrepancies.
d. Information (container documentation) is resubmitted by the offeror addressing concerns in item c.
e. If discrepancies are addressed, approval documentation is issued. Along with the approval documentation, the 222-S Laboratory Complex designated waste acceptance organization will determine if physical/chemical screening will be performed at the offeror's location prior to transfer/shipment. If physical/chemical screening is performed at the offeror's location, a traceable tamper resistant device will be used on the container to demonstrate the transfer/shipment has not been altered.
f. If discrepancies are not addressed, shipment is not approved.

2.3 CONFIRMATION OF OFF-UNIT/OFFSITE WASTE

Confirmation of off-unit/offsite (Appendix 3B of DOE/RL-97-21) hazardous or mixed waste to be accepted into the 222-S TSD unit is performed by 222-S TSD unit designated waste acceptance organization. The 222-S TSD unit designated waste acceptance organization performs a container receipt inspection of all off-unit/offsite waste. Physical/chemical screening may also be performed if not completed at offeror's location. These activities are documented by the 222-S Laboratory Complex designated waste acceptance organization and maintained in the 222-S TSD unit operating record.

2.3.1 Container Receipt Inspection of Off-Unit/Offsite Waste

When the transfer/shipment arrives at the 222-S Laboratory Complex, the container receipt inspection is performed. The container receipt inspection is performed by 222-S Laboratory Complex personnel or the designated waste acceptance organization. The following criteria are evaluated during the container receipt inspection:

a. Number of containers (significant discrepancy for offsite shipments).
b. Bulk quantities (significant discrepancy for offsite shipments).
c. Size of containers.
d. Labels.
e. Container integrity.
f. Tamper resistant seals, if applicable.

Discrepancies identified during the container receipt inspection are communicated to the offeror. Discrepancies are resolved before the mixed waste is unloaded from the truck. Offsite shipments will comply with the provisions of WAC 173-303-370(4) and (5). Once the discrepancies are resolved, the mixed waste is unloaded from the truck and moved into one of the 222-S permitted TSD container storage components (222-S DMWSA, Room 2-B, or Room 4-E) or transferred into the permitted 219-S Tank System .

2.3.2 Physical/Chemical Screening of Off-Unit/Offsite Waste

Physical/chemical screening frequencies are applied to mixed waste based on whether the transfer/shipment is a tanker truck (greater than 417 liters), a bulk container (less than or equal to 417 liters), or a labpack. The parameters for physical/chemical screening may include the following:

a. Visual inspection.
b. Water miscibility/separable organics.
c. Water reactivity.
d. pH.
e. Cyanides.
f. Sulfides.

Visual inspection will be used at a minimum when performing physical confirmation for both solid and liquid wastes. Water miscibility/separable organics and pH are used at a minimum when performing chemical confirmation of liquid and non-debris-type solid wastes. The methods and rationale for selection of these parameters are discussed in Section 3.0. The physical/chemical screening frequencies are as follows.

a. Tanker truck (greater than 417 liters): every transfer/shipment at the offeror's location.

b. Bulk container (less than or equal to 417 liters): every transfer/shipment from each stream from each offeror at the container storage unit or at offeror's location. Containers on each transfer/shipment will be randomly selected based on SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* Chapter 9, unless pre-transfer/shipment review targets particular containers. The frequency on each transfer/shipment will be 10% with a minimum of two containers.

c. Solids/debris type material: every transfer/shipment from each stream from each offeror at the container storage unit or at offeror's location. Containers on each transfer/shipment will be randomly selected unless pre-transfer/shipment review targets particular containers. The frequency for each transfer/shipment will be 10% with a minimum of two containers.

d. Lab pack: every transfer/shipment from each stream from each offeror at the container storage unit or at offeror's location. Containers on each transfer/shipment will be randomly selected based on SW-846 Chapter 9 unless pre-transfer/shipment review targets particular containers. The frequency on outer containers for each transfer/shipment will be 10% with a minimum of two containers. The frequency on inner containers from selected outer containers will be 10% with a minimum of five containers. If the inner container count is less than five, all containers will be screened.

Discrepancies identified during physical/chemical screening activities are resolved before the waste is accepted. When physical screening must be performed in the hot cell for offsite shipments of mixed waste, the 15-day clock described in WAC 173-303-370(4)(b) begins on discovery of the discrepancy. If discrepancies are not resolved, the mixed waste transfer/shipment is rejected.

2.3.2.1 Physical/Chemical Screening Quality Control

Sections 2.3.2.1.1 and 2.3.2.1.2 describe the quality control (QC) elements used to ensure valid screening results.

2.3.2.1.1 Physical Screening Quality Control

Physical screening QC is used by the 222-S Laboratory Complex designated waste acceptance organization to ensure quality visual inspection results. Visual inspection does not consist of the use of instrumentation or chemical tests.

2.3.2.1.2 Chemical Screening Quality Control

Chemical screening QC is used by the 222-S Laboratory Complex designated waste acceptance organization to ensure that appropriate data are obtained when performing chemical screening.

The following applies to each chemical screening parameter.

a. Each lot is evaluated to determine that the lot is usable. Unstable reagents are accounted for when determining the usability of the lot. For each lot, the source, concentration, date of receipt, lot number, and manufacturer/preparer (as applicable) are maintained in a logbook.

b. For individual chemical screening parameters, QC checks are performed in accordance with manufacturer's instructions.

2.3.2.2 Physical/Chemical Screening Exceptions

There are cases in which physical/chemical screening is not required. The exceptions are as follows:

a. Commercial chemical products that are not U and P listed waste in the original product container(s) or products traceable back to the original product container (e.g., off-specification, outdated, or unused products).

b. Chemical screening is not required for mixed waste introduced into the 219-S Tank System through hot cell drains due to ALARA concerns. Physical screening (visual inspection) on mixed waste introduced into the 219-S Tank System through hot cell drains will be completed at the offeror's location or delayed until unpackaged in the hot cell.

c. Other special-case waste could be exempted on a case-by-case basis with prior approval from Ecology.

2.3.2.3 Physical/Chemical Screening Sampling and Analysis

Physical/Chemical screening samples do not require particular sample containers, any container labels, or any sample preservation techniques if the chemical screening tests are performed at the time and location of sampling or as soon as possible thereafter. During any interim period when the sample can not be tested at the time and location of sampling, the sample is stored in a manner that maintains chain of custody and protects sample integrity. Sample collection methods for chemical screening samples are conducted pursuant to WAC 173-303-110(2) or SW-846 Chapter 9 methodologies.

3.0 SELECTING WASTE ANALYSIS PARAMETERS

Regulations [WAC 173-303-300(2) and (5)(a); WAC 173-303-140] require that information be obtained, documented, and/or reported regarding waste accepted into the 222-S TSD units. When characterization information does not constitute acceptable knowledge, sampling and analysis of the waste is required. The need to perform sampling and analysis on a dangerous and/or mixed waste could be identified by 222-S Laboratory Complex personnel or designated acceptance organization during (1) the pre-shipment review process, (2) physical/chemical screening activities, or (3) management of waste in the 222-S TSD units. The 222-S Laboratory Complex personnel or designated acceptance organization may perform sampling and analysis on dangerous and/or mixed waste stored in the 222-S DMWSA, Room 2-B, or Room 4-E based on characterization needs of the receiving onsite TSD unit or offsite TSD facility.

For the parameters, methods, and rationale for off-unit/offsite (see DOE/RL-91-27, Rev. 2, Appendix 3B) waste, information is presented in Table 3-1. For the parameters, methods, and rationale for testing of waste within the 219-S tank system, information is presented in Table 3-2. For the parameters, methods, and rationale for waste managed within the 222-S DMWSA and Room 2-B, information is presented in Table 3-3.

Nonstandard methods are used for physical/chemical screening of waste. Descriptions of these nonstandard methods are provided within 222-S Laboratory operating procedures located at the 222-S Laboratory. These procedures are available to Washington State Department of Ecology (Ecology) on request.

3.1 PHYSICAL SCREENING PARAMETERS

The following methods are used to perform physical screening as identified in Section 2.3.

a. Visual inspection.

   Rationale: This method meets the requirement to ensure consistency between waste containers and the accompanying shipment documentation.

   Method: The container is opened and the contents are removed as needed for visual examination. Homogenous loose solids could be probed to determine the presence of material not documented or for improperly absorbed liquids. Visual observations are compared with the applicable profile information and the container-specific information on documentation.

   Criteria: A container fails the inspection for any of the following reasons: (1) undocumented, improperly packaged, or inadequately absorbed liquids, (2) discovery of prohibited articles or materials listed in Section 1.2, (3) discovery of material not consistent with documented knowledge, and (4) variability greater than 25% by volume in waste stream components (e.g., paper, plastic, cloth, metal).

3.2 CHEMICAL SCREENING PARAMETERS

The following methods may be used to perform chemical screening (fingerprint analysis) identified in Section 2.3.

a. Water miscibility/separable organics.

   Rationale: To determine if the waste is immiscible with water or has separable organics. This information is used to ensure 219-S Tank System waste can meet DST System waste acceptance criteria.

   Method: Water is added to a sample of solid or liquid waste. The solution is observed for evidence of layering.

   Tolerance: A positive indication of layering with water in a waste constitutes a failure.

b. Water reactivity screen.

   Rationale: To determine if the waste has the potential to vigorously react with water, form gases, or other reaction products. This information is used to ensure safe segregation and storage of incompatible waste and to confirm consistency with the documentation.

   Method: Water is added to a sample of solid or liquid waste. The solution is observed for evidence of fuming, bubbling, spattering, or temperature change. These reactions are considered to be positive evidence that the waste is water reactive. This test may be performed if there is indication that it is warranted (i.e., process knowledge).

   Tolerance: A positive indication in a waste that can not be explained by documented constituents constitutes a failure.

c. pH screen.

   Rationale: This method is used to identify the pH and corrosive nature of an aqueous or solid waste, to ensure safe segregation and storage of incompatible waste, and to confirm consistency with shipping documentation.

   Method: Full range pH paper is used for the initial screening. If the initial screen indicates a pH below 4 or above 10, a pH meter or narrow range pH paper could be used. Solids are mixed with an equal weight of water and the liquid portion of the solution is tested. The extractant of the sample is placed on the pH paper. The pH paper is not dipped into the sample.

   Tolerance: pH paper for this test has a sensitivity of ±1.0 pH units. If the pH of a matrix appears to exceed regulatory limits (less than or equal to 2.0 or greater than or equal to 12.5) in waste not documented as being regulated for this property, the container fails the test.

d. Cyanide screen.

Rationale: To indicate if waste could release hydrogen cyanide on acidification near pH 2. This information is used to ensure safe segregation and storage of incompatible waste and to confirm consistency with the documentation.

Method: To a test tube or watch dish containing approximately 2 milligrams of sample, an equal amount of freshly prepared ferrous ammonium citrate is added. 3 Normal hydrochloric acid is used to reduce the pH of the solution to near 2.0. A deep blue color indicates the presence of cyanide. This test may be performed if there is indication that it is warranted (i.e., process knowledge).

Tolerance: A positive indication in a waste that can not be explained by documented constituents constitutes a failure.

e. Sulfide screen.

Rationale: To indicate if the waste could release hydrogen sulfide on acidification near pH 2. This information is used to ensure safe segregation and storage of incompatible waste and to confirm consistency with the shipping documentation.

Method: Approximately 2 milligrams of sample is added to a watch dish or test tube and enough 3 Normal hydrochloric acid is added to bring the pH down to near 2.0. A sulfide test strip is placed in the solution. If the paper turns brown or silvery black, the presence of sulfides in the sample is indicated. This test may be performed if there is indication that it is warranted (i.e., process knowledge).

Tolerance: A positive indication in a waste that can not be explained by documented constituents constitutes a failure.

Table 3-1. Parameters and Rationale for Off-Unit/Offsite Waste.

Parameter[a]	Method[b]	Rationale for Selection
Physical Screening		
Visual inspection	Field method - observe phases, presence of solids in waste	Ensure that waste matches that described on waste profile documentation; identify nonwastewaters; identify waste prohibited by LDR requirements (D009 elemental mercury contaminated with radioactive materials subcategory) related to downstream TSD unit acceptance criteria
Chemical Screening		
Water miscibility/separable organics	Field water mix screen	Ensure that waste matches that described on waste profile documentation; identify separable organics; identify waste prohibited by LDR requirements (D001 high TOC nonwastewater subcategory and D009 radioactive hydraulic oil) related to downstream TSD unit acceptance criteria.
Water reactivity	Field water mix screen	Ensure that waste matches that described on waste profile documentation; ensure compliance with WAC 173-303-395(1)(b). This test may be performed if there is indication that it is warranted (i.e., process knowledge).
pH	Field pH screen (pH paper method)	Ensure that waste matches that described on waste profile documentation; ensure compliance with WAC 173-303-395(1)(b).
Cyanides	Field cyanide screen	Ensure that waste matches that described on waste profile documentation; ensure compliance with WAC 173-303-395(1)(b). This test may be performed if there is indication that it is warranted (i.e., process knowledge).
Sulfides	Field sulfide screen	Ensure that waste matches that described on waste profile documentation; ensure compliance with WAC 173-303-395(1)(b). This test may be performed if there is indication that it is warranted (i.e., process knowledge).
Pre-shipment Review		
Mercury (total)	Generator knowledge or SW-846 Method 7470/7471	Identify waste prohibited by LDR requirements (nonwastewater high mercury subcategories) related to downstream TSD unit acceptance criteria (for nonwastewaters only)
Toxicity characteristic organic compounds	Generator knowledge or SW-846 Methods 1311 and 8260 (volatile organic compounds) and 8270 (semivolatile organic compounds)	Identify waste not identified on the Part A Form.
Polycyclic aromatic hydrocarbons	Generator knowledge or SW-846 Method 8270 or 8100	Identify waste not identified on the Part A Form (for waste with >1% solids and for which WP03 could apply)

[a] Additional parameters can be used on current waste acceptance criteria of the downstream TSD unit. Operation limits transfer/shipments are based on current waste acceptance criteria.
[b] Procedures based on SW-846 unless otherwise noted. When regulations require a specific method, the method shall be followed. For other cases, method will be reliable.

Table 3-2. Parameters, Methods, and Rationale for Testing of Waste Within the 219-S Tank System.

Parameter[a]	Method[b]	Rationale for Selection
General Chemistry and Organic Parameters		
pH or hydroxide	9040	To determine characteristic of transfer/shipment
Total organic carbon	9060	To determine LDR status as a wastewater
Total suspended solids	2540D[b,c]/160.2[c]	To determine LDR status as a wastewater
Toxicity characteristic organic compounds	1311/8260 (volatile organic compounds) and 1311/8270 (semivolatile organic compounds)	To meet receiving unit waste acceptance criteria if requested by the receiving unit.
Semivolatile organic underlying hazardous constituents	8270C (semivolatile organic compounds)	To determine underlying hazardous constituents in aggregated waste
Inorganic Parameters		
Antimony, beryllium, nickel, thallium	1311 as applicable, /6010/6020/200.8[d]	To determine underlying hazardous constituents in aggregated waste
Arsenic, barium, cadmium, chromium, lead, silver, selenium	1311 as applicable, /6010/6020//3010A/200.8[e]	To determine characteristic of transfer/shipment and/or underlying hazardous constituents in aggregated waste.
Mercury	1311 as applicable, /7470A/6010/7000A, 7471, 200.8[d]	To determine characteristic of transfer/shipment and/or underlying hazardous constituents in aggregated waste.

[a] Additional parameters can be used on current waste acceptance criteria of the downstream TSD unit. Operation limits transfer/shipments are based on current waste acceptance criteria.

[b] Procedures based on SW-846 unless otherwise noted. When regulations require a specific method, the method shall be followed. For other cases, method will be reliable.

[c] American Public Health Association Method, 1992, 18th Edition.

[d] EPA-600/4-79-020, *Methods for Chemical Analysis of Water and Wastes.*

Table 3-3. Parameters, Methods, and Rationale for Waste Managed within the 222-S DMWSA, Room 2-B, and Room 4-E. (2 sheets)

Parameter[a]		Method[b]	Media Type	Rationale for Selection
General Chemistry				
Flashpoint		1010/1020	Liquid	To ensure compliance with WAC 173-303-395(1)(b); determine regulatory status as D001 waste and applicability of LDR requirements
pH	Liquid	9040	Liquid, sludge	To determine regulatory status as D002/WSC2 waste; to provide proper waste designation; to determine applicability of LDR requirements and state-only requirements; and to identify waste that might compromise container integrity
	Solid	9045	Solid	
Hydroxide		9040	Liquid	To meet DST system waste acceptance criteria.
Free liquids		9095	Liquid, sludge, solid	To determine appropriate state-only LDR status of the waste.
Cyanide		9010/9012	Liquid, sludge, solid	To ensure compliance with WAC 173-303-395(1)(b); to provide proper waste designation and applicability of LDR requirements.
Sulfide		9030	Liquid, sludge, solid	To ensure compliance with WAC 173-303-395(1)(b); to provide proper waste designation and applicability of LDR requirements.
Organic				
PCBs		8082	Liquid, sludge, solid	To determine proper waste management of waste in accordance with WAC 173-303-071(3)(k) to determine LDR requirements.
Total organic carbon		9060	Liquid, sludge, solid	To meet DST system waste acceptance criteria; to determine LDR status as a wastewater; determine applicability of state-only designation requirements
Total organic halides		9020/9021/9022	Liquid, sludge	To determine proper waste designation and applicability to state-only requirements.
Ammonia		300.7[c]4500-NH_3G[d]	Liquid, sludge	To meet DST System waste acceptance criteria.
Chloride		9056/300.0[e]	Liquid, sludge	To meet DST System waste acceptance criteria.
Persistent constituents		9075/9076/9077/ 9211/9212/9214/ 9250/9251/9253	Liquid, sludge	To determine proper waste designation and applicability to state-only designation requirements.
Total suspended solids		2540D[d]/160.2[e]	Liquid, sludge	To determine LDR status as a wastewater
Volatile organic compounds		1311/8260	Liquid, sludge, solid	To determine proper waste designation and applicability of LDRs.

Table 3-3. Parameters, Methods, and Rationale for Waste Managed within the 222-S DMWSA, Room 2-B, and Room 4-E. (2 sheets)

Parameter[a]	Method[b]	Media Type	Rationale for Selection
Semivolatile organic compounds	1311/8270	Liquid, sludge, solid	To determine proper waste designation and applicability of LDRs.
Chlorinated herbicides	8151	Liquid	To determine proper waste designation and applicability of LDRs.
Inorganic			
Antimony, beryllium, nickel, thallium	1311 as applicable, /6010/6020/200.8[e]	Liquid, sludge, solid	To determine applicability of LDRs.
Arsenic, barium, cadmium, chromium, lead, silver, selenium	1311 as applicable, /6010/6020/3010A/200.8[e]	Liquid, sludge, solid	To provide for proper waste designation and applicability of LDRs.
Sodium	6010	Liquid	To meet DST System waste acceptance criteria.
Mercury	1311 as applicable, A/7000A7471/6010/.8[e]	Liquid, sludge, solid	To provide for proper waste designation and applicability of LDRs.

[a] Additional parameters can be used on current waste acceptance criteria of the downstream TSD unit. Operation limits transfer/shipments are based on current waste acceptance criteria.

[b] Procedures based on EPA SW-846, unless otherwise noted. When regulations require a specific method, the method shall be followed. For other cases, method will be reliable.

[c] EPA

[d] APHA 1992, *Standard Methods for the Examination of Water and Wastewater*.

[e] EPA-600/4-79-020.

4.0 SELECTING SAMPLING PROCESSES

Sampling processes used to acquire and manage samples differ because of physical variations of waste managed in the 222-S TSD components. The specific sampling methods and equipment used vary with the chemical and physical nature of the waste material and sampling circumstances. Although worker health and safety aspects are outside the scope of this WAP, health and safety protocols are followed to protect personnel when collecting samples of dangerous and/or mixed waste.

Sampling processes for physical/chemical screening confirmation activities are discussed in Section 2.3.2.3.

4.1 SAMPLE CONTAINERS AND LABELS

Sample collection container selection and labeling practices follow SW-846 protocol. Sample collection containers and equipment are decontaminated according to EPA guidelines before use. Sample containers and equipment are frequently discarded rather than reused. Sample containers and equipment are maintained to ensure the data quality objectives of the sampling event are met.

4.2 SAMPLE PRESERVATIVES

Sample preservatives and holding times follow SW-846 protocol.

4.3 SAMPLE COLLECTION METHODS

Sample collection methods conform to the representative sample methods referenced in WAC 173-303-110(2). Sampling methods and equipment used are identified in Table 4-1. Representative samples of liquid waste from containers (vertical "core sections") are obtained using a composite liquid waste sampler (Coliwasa) or tubing, as appropriate. If a liquid waste has more than one phase, each phase is separated for individual testing depending on the waste management pathways of the phases. Other waste types that may require sampling are sludges, powders, and granules. In general, nonviscous sludges are sampled using a Coliwasa. Highly viscous sludges and cohesive solids are sampled using a trier, as specified in SW-846. Dry powders and granules are sampled using a thief, also as specified in SW-846. Waste from the 219-S Tank System is sampled with the sampling equipment installed on the tank system.

The number of grab samples collected from a container depends on the amount of waste present and on the homogeneity of the waste, determined on a case-by-case basis by 222-S Laboratory Complex management or the designated waste acceptance organization. In most instances, there is only one container of waste present. In such instances, it is common to acquire only one vertical composite sample (e.g., Coliwasa). If more than one container of a waste stream is present, all or some of the waste containers are samples. When some of the waste containers will be sampled, the containers chosen for sampling will be based on random number generating techniques in SW-846 Chapter 9 and the number of samples necessary to achieve data quality objectives.

A sample is collected from waste within the 219-S Tank System from the sampling equipment installed on the tank system (DOE/RL-91-27, Chapter 4.0, Rev. 2). The contents of the tank are mixed prior to collection of the sample.

4.4 QUALITY ASSURANCE/QUALITY CONTROL

There are many elements of quality assurance(QA)/quality control (QC) associated with sampling processes at the 222-S TSD units. These elements are as follows.

a. A log of sampling activities is maintained in accordance with standard industrial practices.

b. A record of sample custody from the time of sample collection to receipt by a laboratory custodian is established. This chain of custody includes the names of responsible individuals and the dates and times of custody transfers.

c. Each sample collected is uniquely identified.

d. Samples are traceable to the data records.

e. Samples are packaged to maintain preservation and to meet transportation requirements necessary to maintain the sample under the exclusions contained in WAC 173-303-071(3)(l), (r), and (s). Alterations of samples during collection or transfer are documented.

f. Samples are protected from loss, damage, or tampering.

g. Analytical data packages are evaluated for completeness (all required parameters present using required methodology), whether applicable holding times have been met, and whether any flags require corrective action.

Table 4-1. Sampling Equipment.

Waste Form	Waste Type	Equipment[a]
Liquids	Free-flowing liquids and slurries	Coliwasa, SW-846 Chapter 9, glass thief or pipette, or 219-S Tank System sampling system
Solidified liquids	Sludges	Trier, SW-846 Chapter 9, scoops and shovels
Sludges	Sludges	Trier, SW-846 Chapter 9, scoops and shovels
Soils	Sand or packed powders and granules	Auger, SW-846 Chapter 9, scoops and shovels
Absorbents	Large-grained solids	Large trier, SW-846 Chapter 9, scoops and shovels
Wet absorbents	Moist powders or granules	Trier, SW-846 Chapter 9, scoops and shovels
Process solids and salts	Moist powders or granules	Trier, SW-846 Chapter 9, scoops and shovels
	Dry powders or granules	Thief, SW-846 Chapter 9, scoops and shovels
	Sand or packed powders and granules	Auger, SW-846 Chapter 9, scoops and shovels
	Large-grained solids	Large trier, SW-846 Chapter 9, scoops and shovels
Ion exchange resins	Moist powders or granules	Trier, SW-846 Chapter 9, scoops and shovels
	Dry powders or granules	Thief, SW-846 Chapter 9, scoops and shovels
	Sand or packed powders and granules	Auger, SW-846 Chapter 9, scoops and shovels

[a] Other American Society for Testing and Materials approved equipment could be used to collect samples.

Coliwasa = composite liquid waste sampler.

5.0 SELECTING A LABORATORY, LABORATORY TESTING, AND ANALYTICAL METHODS

Quality control is applied in implementing both sampling and analytical techniques. Specific performance standards for QA and QC procedures for individual sampling and analysis activities are dynamic and are revised as warranted to reflect technological advances in available, appropriate techniques. These performance standards are described in policies maintained and used at 222-S Laboratory Complex and are available for review by Ecology on request. The QA/QC practices will comply with WAC 173-303-110(2) and (3) and *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989), Action Plan, Section 6.5 requirements.

5.1 SAMPLING PROGRAM

The selection of sample collection devices within a laboratory depends on the type of sample, the sample container, the sampling location, and the nature and distribution of regulated constituents in the waste. In general, the methodologies used correspond to those referenced by WAC 173-303-110(2) or SW-846 Chapter 9. The selection and use of the sample collection device are supervised or performed by a person who is thoroughly familiar with sampling protocols.

Sampling equipment is constructed of materials that are nonreactive with the waste being sampled. Materials such as glass, polyvinyl chloride plastic, aluminum, or stainless steel could be used. Care is taken in the selection and use of the sample collection device to prevent contamination of the sample and to ensure compatibility with waste being sampled. Individual container samples that are compatible could be composited before testing.

5.2 ANALYTICAL PROGRAM

A program of analytical QC practices and procedures has been developed on the Hanford Facility to ensure that precision, accuracy, representativeness, and completeness are maintained throughout the laboratories. Good laboratory practices that encompass sampling, sample handling, housekeeping, and safety are maintained at onsite laboratories. The testing methods described in Chapter 3 are intended to comply with WAC 173-303-110(3) requirements.

Laboratories make changes to procedures (both regulatory and internally developed procedures) for a variety of reasons. The nature of the change can vary from minor to significant. Therefore, this document defines three categories of changes made in the laboratory. Laboratory conformance to the documentation requirements for each of these changes shall ensure that the end-user of the data is aware of the significance of the changes and the impact expected on the data. A limited number of methods must be followed as written due to the regulations encompassing how the results will be used.

5.2.1 Substitution

Substitution is an adjustment in a procedure that a reasonable, technically competent person would be expected to consider equivalent. Substitution would have no significant effects on final results. This would be clearly evident in the QC data associated with the final results.

Therefore, substitution would be considered inconsequential. Additional information regarding the latitude given to the laboratory is in Sections 2.1.1 and 2.1.2 of SW-846.

Examples include substitution of equivalent columns yielding equivalent performance characteristics (use of a capillary column as opposed to a packed column would not meet this definition) and substitution of different glassware that results in the same overall digestion, extraction, or separation efficiency. Ratioed sample and reagent reductions are not considered substitution.

5.2.2 Deviation

Deviation is divergence from the original procedure that does not adversely impact the analyst's ability to meet the precision, accuracy, detection limit, selectivity, and QC criteria of the procedure. Therefore, the decision to deviate shall be based on published literature (e.g., alternate methods) and/or known sample chemistry.

5.2.2.1 Deviation Example

Examples include using packed versus capillary column and, on limited applications, using different sample sizes accompanied by subsequent ratioed changes to all reagents and standard additions while maintaining the same final extract concentration. In some very limited cases, deviation may include varying reagent additions to effect similar digestion and/or analytical performance to the original procedure (e.g., addition of matrix modifier). A deviation could also be an additional precipitation reaction resulting in enhanced analyte purification. Such deviations can only be considered to be valid if the originally agreed-on precision, accuracy, sensitivity, and selectivity are maintained.

5.2.2.2 Cautions on Using Deviations

The analyst is cautioned in using ratioed reductions. In some cases, significant reductions in the quantity of materials tested affects the ability to guarantee reproducible results in terms of the sample matrix precision. For example, in reducing the sample preparation weight from 1.0 grams to 0.1 grams, the ability of the laboratory to address sample heterogeneity concerns is brought into question. However, the laboratory could perform replicate preparations to address this concern and provide more useful information related to sample heterogeneity. Additional documentation is required in this case.

Also, the analyst is cautioned in varying reagent additions. Clearly, matrix adjustment could be necessary to effect similar analyte and isotope performance under a given technique. However, the ability to reproduce such situations hinges on the existence of a documented record of the deviation.

5.2.3 Modification

Modification changes the character of a procedure and thereby potentially limits the capacity of a procedure to meet the originally stated precision, accuracy, detection limit, selectivity, and QC criteria. Because the impact of such a modification can not be ascertained before implementation, it must be demonstrated by application.

Examples include using closed vessel digestion instead of standard beaker digestion, using alternative reagents for waste management or safe handling considerations, using different sample sizes accompanied by nonratioed reagent addition, using alternative analytical technology, and using extended holding times.

Mixed waste samples provide a good example of the need for method modification. These samples can contain high levels of radioactivity that can create the necessity for analytical procedure modifications. In particular, Hanford Site samples could contain salts that negatively affect the efficiency of published methods designed for the preparation of waters, soils, and sludges. Disposal of mixed waste also affects the decision to use a procedure as is or to modify it to reduce the amount of waste produced during processing. Special handling techniques might need to be used to keep the exposure to radioactive agents to ALARA; the ALARA principle could affect holding times.

5.3 CONCLUSION

The aforementioned sampling and analysis QA/QC practices help ensure that the data obtained are sufficiently precise and accurate for the decision required of the dangerous and/or mixed waste stream being sampled. The sampling and analysis results are used by 222-S Laboratory Complex personnel or designated waste acceptance organization personnel to

a. Determine acceptable knowledge.
b. Approve pre-transfer/shipment documentation.
c. Determine the appropriate method of treatment, storage, and/or disposal of a particular waste.
d. Determine if a treatment standard has been met.

6.0 SELECTING WASTE REEVALUATION FREQUENCIES

The reevaluation (repeat and review) frequency to review a waste generating process and associated waste profile documentation is every 2 years or more often if

a. Conditions in WAC 173-303-300(4)(a) or (b) arise.
b. Off-unit/offsite (see Appendix 3B of DOE/RL-91-27) waste is rejected after receiving the waste.

When a waste generating process and associated waste profile documentation is reevaluated, 222-S Laboratory Complex personnel or designated waste acceptance organization could request the organization generating the waste to do one or more of the following:

a. Confirm the current waste profile documentation is accurate.
b. Supply new waste profile documentation.

Reevaluation frequencies do not include off-unit/offsite wastes that are accepted as a single container or one time transfer/shipment. These wastes will be evaluated on a case-by-case basis.

7.0 SPECIAL PROCEDURAL REQUIREMENTS

Special procedural requirements for the 222-S TSD unit includes procedures for receiving waste generated outside the 222-S Laboratory Complex, procedures for ignitable, reactive, and incompatible waste, and provisions for complying with federal and state LDR requirements.

7.1 PROCEDURES FOR RECEIVING WASTE GENERATED OUTSIDE THE 222-S LABORATORY COMPLEX

Mixed waste received from outside the 222-S Laboratory Complex is referred to as off-unit/offsite waste. Off-unit/offsite waste acceptance procedures are identified in Sections 2.2 and 2.3. The procedures are different because of either regulatory requirements pertaining to offsite waste receipt or the waste generation and management process can not be detailed in the WAP to address acceptable knowledge requirements. Once off-unit/offsite waste is accepted into the 222-S TSD unit, the mixed waste is managed using the same process as mixed waste generated within the 222-S Laboratory Complex.

7.2 PROCEDURES FOR IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE

The 222-S TSD unit accepts ignitable, reactive, or incompatible waste. The following precautions are taken before these waste types are accepted.

a. Pre-transfer review for 222-S Laboratory Complex generated waste identifies whether the waste is ignitable, reactive, or incompatible. Pre-transfer/shipment review and/or chemical screening identify whether the off-unit/offsite waste is ignitable, reactive, or incompatible.

b. If analysis of the characterization information leads to a conclusion that the waste is an ignitable or reactive waste, acceptance of the waste into 222-S Laboratory TSD unit must be conducted pursuant to WAC 173-303-395(1), and as applicable, the waste management specific requirements contained in WAC 173-303-630(8) or –640(9).

c. If analysis of the characterization information leads to a conclusion that the waste is an incompatible waste, acceptance of the waste into 222-S TSD unit must be conducted pursuant to WAC 173-303-395(1), and as applicable, the waste management specific requirements contained in WAC 173-303-630(9) or –640(10). A compatibility review shall be performed to identify storage and management requirements.

Mixed waste in the 219-S Tank System consists of dilute aqueous waste with low organic content. Transfer of waste into the 219-S Tank System is performed with an adequate amount of flush water to prevent corrosion of the tank system components. From PB80-221005, *A Method for Determining the Compatibility of Hazardous Wastes*, the 219-S Tank System aggregated waste classifies as Reactivity Group Number 106, "water and mixtures containing water." This type of waste could exhibit some reaction with concentrated acids, certain organic or inorganic compounds that could generate innocuous or flammable gases in contact with water, and inorganic sulfides. Additionally, the mixed waste contains mineral acids at low concentrations, which would be incompatible with cyanides, inorganic sulfides, and water reactive substances.

Given the conditions under which waste is managed in the 219-S Tank System, compliance with WAC 173-303-395(1)(b) is ensured by the following screening tests for off-unit/offsite waste:

a. The pH of mixed waste is measured to identify concentrated acids and bases to ensure adequate flush volumes are used.
b. A water mix screening test is performed to identify any potentially water-reactive waste and to ensure an appropriate introduction rate. This includes waste that generates heat or gases in contact with water. This screen will be used if water-reactive waste is suspected.
c. Cyanide and sulfide screening tests are performed to ensure that uncontrolled toxic gases do not threaten human health and the environment. This screen will be used if cyanide or sulfide bearing waste is suspected

7.3 PROVISIONS FOR COMPLYING WITH FEDERAL AND STATE LAND DISPOSAL RESTRICTION REQUIREMENTS

Dangerous and/or mixed waste destined for disposal is subject to the LDRs of WAC 173-303-140 and Title 40, *Code of Federal Regulations*, Part 268, "Land Disposal Restrictions" (40 CFR 268), with the exception of transuranic mixed waste. Transuranic mixed waste is anticipated to be disposed of at the Waste Isolation Pilot Plant and is not subject to federal or state-only LDR treatment standards. Chemical constituents subject to LDRs are identified in 40 CFR 268 by reference in WAC 173-303-140. Waste must meet certain treatment standards as specified in 40 CFR 268 and WAC 173-303-140 prior to disposal. Although disposal does not occur within the 222-S Laboratory Complex, LDR requirements apply to the generation, storage, and treatment of dangerous and/or mixed waste preceding disposal.

If arrangements are made between the organization generating the waste and 222-S Laboratory Complex personnel, LDR information can be obtained on waste while the waste is being managed in the 222-S TSD units. Federally based LDR information for dangerous and/or mixed waste in the container storage units will be obtained in accordance with 40 CFR 268.7(a). For waste managed in a container storage unit believed to meet treatment standards, information is obtained through sampling and analysis of a grab sample while waste is managed in the container storage waste management unit, or arrangements are made with subsequent TSD unit personnel to obtain the acceptable knowledge capable of proving the treatment standard is met.

For the 219-S Tank System, applicable treatment standards from 40 CFR 268.40 will be identified prior to the introduction of waste into the tank system to identify specified technologies. Underlying hazardous constituents for a batch of mixed waste to be transferred to another onsite TSD unit or offsite TSD facility will be determined based on existing knowledge of the waste constituents contained in waste profile documentation and sampling and analysis results from a grab sample of aggregated tank system waste. A grab sample will be taken from every fifth batch of aggregated tank system waste to be transferred or once a calendar year, whichever occurs sooner. Volatile organics, pesticides and herbicides, and constituents not found at the Hanford Facility are not reasonably expected to be present in aggregated

219-S Tank System waste. Underlying hazardous constituents parameters selected for testing will include the following:

a. Semivolatile organic compounds identified by SW-846 Methods listed in Table 3-2 of this document.
b. Inorganic parameters identified in Table 3-2 of this document except for sodium.

For dangerous and/or mixed waste managed within the 222-S TSD unit, if the waste meets federal treatment standards, a certification must be prepared that the waste meets the treatment standards. The 222-S Laboratory Complex personnel or designated acceptance organization will prepare appropriate LDR certifications and document knowledge as either a storage unit or a treatment unit managing restricted waste.

7.3.1 Waste Treatment

Within the 222-S TSD units, waste treatment only occurs in the 219-S Tank System. Treatment does not occur in the container storage waste management units. Specific treatment activities performed in the 219-S Tank System include deactivation, pH adjustment, chemical additions, and treatment of state-only extremely hazardous waste.

a. Deactivation, as defined in 40 CFR 268.42, is used to remove the characteristic of mixed waste due to ignitability (D001), corrosivity (D002), and/or reactivity (D003). Treatment techniques include neutralization and controlled reaction with water. Controlled reaction with water is the primary method of treatment for reactive waste such as sodium metal, strong acids and bases, or incompatible waste.

b. pH adjustment is the primary method of treatment for corrosive waste that has a pH less than or equal to 2 and/or greater than or equal to 12.5. Examples of bases that could be used as pH adjusting agents include sodium hydroxide, calcium hydroxide, or calcium carbonate. Examples of acids that could be used to neutralize bases are hydrochloric acid and sulfuric acid.

c. Chemical additions occur to make the waste more amenable for storage in the DST System. Typically, sodium nitrite is added for corrosion protection.

d. Treatment of state-only extremely hazardous waste (WT01 and WP01) is performed in accordance with Revised Code of Washington 70.105.050(2) and/or WAC 173-303-140(4)(a) as applicable.

7.3.2 Analytical Methods

If sampling and analysis is performed on a waste to demonstrate an LDR has been met, the treatment standard may specify a method that must be used. Methods identified in Chapter 3 meet LDR requirements. A grab sample is used to obtain the representative sample for containerized waste.

7.3.3 Land Disposal Restriction Certification of Treatment

When LDR treatment has been completed and sample results (if applicable in accordance with 40 CFR 268.40 and WAC 173-303-140) have verified the LDR treatment is successful, certification of the LDR treatment is completed by the 222-S TSD units personnel or designated waste acceptance organization. The certification statement is prepared in accordance with 40 CFR 268.7 or 268.9. Where a LDR waste does not meet the applicable treatment standards set forth in 40 CFR 268.40 and WAC 173-303-140, the information contained in the notice is obtained.

8.0 RECORDKEEPING

Recordkeeping requirements applicable to this WAP are described in Chapter 2 and as follows:

a. Confirmation records described in Chapter 2 will be maintained in accordance with Condition II.I.1.b of the *Hanford Facility RCRA Permit, Dangerous Waste Portion*.

b. Waste profile documentation described in Chapter 2 will be maintained in accordance with Condition II.I.1.j of the *Hanford Facility RCRA Permit, Dangerous Waste Portion*.

c. LDR records described in Section 7.3 will be maintained in accordance with WAC 173-303-380(1)(j)(k)(n) or (o) in the 222-S Laboratory Complex unit-specific portion of the Hanford Facility operating record.

9.0 REFERENCES

40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*, as amended.

40 CFR 268.7, "Testing, tracking, and recordkeeping requirements for generators, treaters, and disposal facilities," *Code of Federal Regulations*, as amended.

40 CFR 268.9, "Special rules regarding wastes that exhibit a characteristic," *Code of Federal Regulations*, as amended.

40 CFR 268.40, "Applicability of treatment standards," *Code of Federal Regulations*, as amended.

40 CFR 268.42, "Treatment standards expressed as specified technologies," *Code of Federal Regulations*, as amended.

62 FR 62079, 1997, "Mixed Radioactive and Hazardous Waste; Testing Requirements," *Federal Register*, Vol. 62, pp. 62079-62094 (November 20).

APHA, 1992, *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, Washington, D.C.

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EPA-600/4-79-020, "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, Cincinnati, Ohio.

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PB80-221005, 1980, "A Method for Determining the Compatibility of Hazardous Wastes," U.S. Environmental Protection Agency, Washington, D.C.

Settlement Agreement re: Washington v. Bodman, Civil No. 2:03-cv-05018-AAM, U.S. Department of Energy and Washington State Department of Ecology, dated January 6, 2006.

SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, Third Edition, as amended, U.S. Environmental Protection Agency, Washington, D.C., September 1986.

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Appendix 3B

APPENDIX 3B

SETTLEMENT AGREEMENT

The Settlement Agreement provided in this appendix allows specific offsite waste streams to be accepted and managed at the 222-S TSD unit (Chapter 1.0, Part A Form) and the 222-S Laboratory.

Receipt of offsite waste not currently specified in the Settlement Agreement is not allowed at the 222-S TSD unit or laboratory unless the Settlement Agreement (Paragraph 8) is modified.

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SETTLEMENT AGREEMENT re: *WASHINGTON v. BODMAN*,
Civil No. 2:03-cv-05018-AAM
January 6, 2006

I. INTRODUCTION

The Department of Energy's (DOE) and the Washington State Department of Ecology's (Ecology) shared interest in the effective cleanup of the Hanford Site provides an opportunity to resolve the litigation involving the Hanford Solid Waste EIS. The overarching goal of this Settlement Agreement is to resolve the litigation and improve the relationship between DOE and Ecology to be more cooperative and collaborative. This Agreement is intended to resolve Ecology's groundwater analysis concerns in the HSW EIS and to provide an approach to analyze waste management actions at the Hanford Site. It is important to Ecology and DOE that on-going waste management operations and progress on tank waste treatment and closure continue. It is important to DOE that some off-site waste can be sent to Hanford for treatment, storage and disposal, recognizing the legal and policy objections of the State of Washington. The actions described in the following paragraphs are intended to satisfy applicable NEPA and SEPA requirements so that waste management and tank farm clean up work can continue and future permit actions are supported.

II. AGREEMENT

1. The parties agree that the existing scope of the Hanford Tank Closure EIS (TC EIS) (currently under development) will be expanded to provide a single, integrated groundwater analysis that will cover all of the waste types addressed in the Hanford Solid Waste EIS (HSW EIS) alternatives and cumulative impact analyses. The expanded TC EIS will be renamed the "Tank Closure and Waste Management EIS" (TC&WM EIS).

2. Pending finalization of the TC&WM EIS, the HSW EIS will remain in effect to support ongoing waste management activities at Hanford (including off-site waste transportation such as TRU and TRUM shipments to WIPP), in combination with other applicable Hanford Site NEPA and CERCLA documents, permits and approvals; provided, that pending finalization of the TC&WM EIS, DOE will not rely on the groundwater analysis in the HSW EIS for decision-making. When completed, the TC&WM EIS will supersede the HSW EIS. As a Cooperating Agency, Ecology will actively participate in the preparation of the TC&WM EIS as described in the *Memorandum of Understanding ("Cooperating Agency MOU" or "MOU") Between the U.S. Department of Energy and Washington State Department of Ecology for the Hanford Site Tank Closure & Waste Management EIS ("TC&WM EIS")*, dated January 6, 2006. The Cooperating Agency MOU has concurrently been developed by the parties and describes the cooperative relationship, roles, and responsibilities of the parties for purposes of preparing the TC&WM EIS.

3. Where feasible and appropriate, the TC&WM EIS will incorporate information from the HSW EIS that is not affected by the revised or updated analyses that will be performed in the TC&WM EIS, to create a single, comprehensive EIS addressing proposed tank closure

and solid waste management activities for the Hanford Site. Such incorporation will be direct (as opposed to by reference) so that a single, integrated document is available for both public and agency reference. As mutually agreed to by the parties, the TC&WM EIS will update, revise, or re-analyze various resource areas from the HSW EIS, including providing quality assurance review as appropriate, to make them current and reflect the latest waste inventories and analytical assumptions being used for purposes of analysis in the TC&WM EIS. All updated analyses would, as appropriate, be included in the revised quantitative cumulative impact analysis in the TC&WM EIS.

4. DOE will utilize and apply the existing TC EIS procedures and requirements in expanding the scope of the current groundwater analyses in the expanded TC&WM EIS. These procedures and requirements include documentation of EIS team qualifications, required training or reading logs, and implementation of applicable provisions of DOE Order 451.1B, Chg. 1.

5. With Ecology's participation as a Cooperating Agency and consistent with the MOU, DOE will undertake additional public scoping of the expanded groundwater and other revised analyses to be included within the TC&WM EIS.

6. Ecology will remain a "Cooperating Agency" (as defined and described by 40 C.F.R. § 1501.6 and 40 C.F.R. § 1508.5) on the TC&WM EIS, just as it has been to date on the TC EIS.

7. The parties acknowledge that a revised MOU acceptable to both parties has been developed that replaces the current Ecology/DOE (ORP) Cooperating Agency MOU in place for the TC EIS. This revised MOU is a separate but related document entered into by the parties concurrent with this Settlement Agreement. The MOU expresses the likely benefits of the cooperative relationship between the agencies, and provides a full, open, and meaningful role for Ecology in the document's development. It also preserves Ecology's ability to express technical or policy points of view in a Foreword to the TC&WM EIS. The MOU provides a process for addressing such views for inclusion in the TC&WM EIS. In some cases, this process may result in additional sensitivity analyses. In the MOU, the parties also agree that periodic quality control reviews of data used to model impacts will be done and will incorporate "lessons learned" and recommendations from DOE's recent review of data quality and control issues in the HSW EIS. Finally, the MOU makes clear that Ecology's role as a Cooperating Agency does not mean that Ecology or the State of Washington agree, either from a technical or policy basis, with the scope of all waste management alternatives analyzed in the TC&WM EIS, or with the substance of all decisions DOE might make following finalization of the TC&WM EIS. While the MOU is a separate document from this agreement, the concepts captured in the MOU, as identified above, are material consideration for Ecology and DOE to enter into this Settlement Agreement.

8. Pending finalization of the TC&WM EIS and the publication of appropriate Record(s) of Decision in the *Federal Register*, and as may be further limited by applicable law, the parties agree that DOE will not import offsite LLW/MLLW or Transuranic waste to the Hanford Site, except as permitted in the existing stipulations that have been agreed upon with the State and entered as orders of the court in the *Washington v. Bodman* litigation, provided that the exemptions that are included in the stipulations for LLW and MLLW shall also be applied to TRU and TRUM waste. These exemptions include:

   a) Naval reactor compartments, reactor core barrels, reactor closure heads, and pumps from Puget Sound Naval Shipyard or Pearl Harbor Naval Shipyard that may contain LLW or MLLW;

   b) Demolition wastes from the Emergency Decontamination Facility at Kadlec Hospital in Richland;

   c) Materials resulting from DOE-related work at Battelle Pacific Northwest National Laboratory's facilities in Richland, Washington;

   d) Materials from treatability studies conducted off-site on waste samples from the Hanford Site's underground tanks;

   e) Samples of wastes from Hanford;

   f) Materials shipped from Hanford for off-site treatment and returned to Hanford for later disposition; and

   g) Materials shipped from Hanford for off-site disposal, but returned to Hanford because the materials failed to meet Waste Acceptance Criteria or otherwise could not be disposed of at the intended disposal site.

9. With respect to current pending permit modifications for operational treatment, storage, and disposal (TSD) units (*e.g.*, T-Plant), Ecology will satisfy Washington's State Environmental Policy Act (SEPA) requirements in making permit modification decisions by relying on a SEPA checklist submitted with the modification application that combines material drawn from the HSW EIS (which has been subject to quality assurance review, as appropriate) and additional material submitted by DOE with the SEPA checklist.

III. STIPULATION AND DISMISSAL OF ACTION

In consideration of the agreements herein, the State agrees to dismiss without prejudice its claims alleging violations of the National Environmental Policy Act (NEPA) set forth in the complaint in *Washington v. Bodman*, Civil No. 2:03-cv-05018-AAM. The United States agrees to the dismissal, subject to agreement on an appropriate stipulation. The State agrees to file an agreed upon Stipulation within ten days of the Parties' approval of this Agreement.

The Parties agree to request in the Stipulation that the Court enter a final judgment as to the HWMA/RCRA claims in *Washington v. Bodman*, Civil No. 2:03-cv-05018-AAM. The Parties agree that this final judgment will give rise to DOE's contingent obligations under the Tri-Party Agreement's M-91 milestone series.

IV. EFFECTIVE DATE

This Agreement shall be effective after completion of all of the following: the signature by the State and the United States on this Agreement; filing the Stipulation with the Court; the Court's dismissal of the NEPA claims and entry of final judgment as to the claims under the HWMA/RCRA.

V. ATTORNEY'S FEES

Each party shall bear its own costs and fees associated with the *Washington v. Bodman* litigation through the date of dismissal and entry of judgment.

Ines Triay
Ines Triay (EM-3), Office of Environmental Management
U.S. Department of Energy
DATED: 1/6/06

Jay J. Manning
Jay Manning, Director
Washington State Department of Ecology
DATED: 1/6/06

APPROVED AS TO FORM:

Andrew A. Fitz, WSB #22169
Assistant Attorney General
Attorney for Plaintiff
DATED: 1/06/06

Charles R. Shockey
Charles R. Shockey, DC Bar # 914879
Attorney, U.S. Department of Justice
Attorney for Defendants
DATED: 1/6/06

Appendix 4A

APPENDIX 4A

ENGINEERING DRAWINGS

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APPENDIX 4A

ENGINEERING DRAWINGS

H-2-78364, Rev. 0, Sheet 7

H-2-825524, Rev. 3, Sheet 1

H-2-829177, Rev. 0, Sheet 1

H-2-93451, Rev. 7, Sheet 1

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Appendix 4B

APPENDIX 4B

ENGINEERING ASSESSMENTS

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CONTENTS

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APPENDIX 4B-1

INTEGRITY ASSESSMENT REPORT OF TANKS TK-101 AND TK-102, JUNE 1999, HNF-4589, REV. 0, WASTE MANAGEMENT FEDERAL SERVICES OF HANFORD, INC., RICHLAND, WASHINGTON

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JUN 17 1999

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 620989

2. To: (Receiving Organization) Waste Management	3. From: (Originating Organization) Fluor Danial Northwest	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: W-178	6. Design Authority/Design Agent/Cog. Engr.: David S. McShane	7. Purchase Order No.: N/A
8. Originator Remarks: FOR RELEASE		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 219-S
		12. Major Assm. Dwg. No.: N/A
11. Receiver Remarks:	11A. Design Baseline Document? ☒ Yes ○ No	13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-4589	ALL	0	INTEGRITY ASSESSMENT REPORT OF TANKS TK-101 AND TK-102	E	2	1	6

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority ~~L.D. Goodwin~~		6/8/99	T6-04	1		M.A. Cahill	M.A. Cahill	6/9/99	T6-03
3	1	Design Agent D.S. McSHANE	David McShane	6/10/99	B4-09	~~3~~		~~D.S. McShane~~			~~B4-09~~
		Cog. Eng.				3		G.S. Chinnery			N1-29
1	1	Cog. Mgr. S.L. BEEY		6/10/99	T6-04						
		QA									
		Safety									
1	1	Env. K.M. LEONARD			T6-12						

18. D.S. McShane 6/10/99 D.S. McShane — Signature of EDT Originator — Date	19. M A Cahill 6/9/99 M.A. Cahill — Authorized Representative for Receiving Organization — Date	20. 6/10/99 Design Authority/ Cognizant Manager — Date	21. DOE APPROVAL (if required) Ctrl No. ○ Approved ○ Approved w/comments ○ Disapproved w/comments

BD-7400-172-2 (10/97)

BD-7400-172-1

S

HNF-4589, Rev. 0

Integrity Assessment Report of Tanks TK-101 and TK-102

David S. McShane
Fluor Daniel Northwest
Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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Abstract: Integrity assessment of TK-101 and TK-102 for project W-178.

6/16/99

Release Approval Date

DATE: HANFORD RELEASE ID: 2
STA: 4
JUN 17 1999

Release Stamp

Approved For Public Release

A-6400-073.1 (10/97)

HNF-4589
Rev. 0

INTEGRITY ASSESSMENT REPORT OF TANKS TK-101 AND TK-102

PROJECT W-178
219-S SECONDARY CONTAINMENT UPGRADE

Prepared for
Waste Management Hanford

Prepared by
David S. McShane P.E.
Fluor Daniel Northwest

June 1999

TABLE OF CONTENTS

FIGURES

TABLES

1.0 INTRODUCTION AND BACKGROUND

1.1 Scope

This Integrity Assessment Report (IAR) is prepared by Fluor Daniel Northwest (FDNW) for Waste Management Federal Services of Hanford, Inc., (WMH), the operations contractor; Fluor Daniel Hanford (FDH), the Hanford Site Manager; and the U. S. Department of Energy (DOE), the system owner. This IAR addresses the evaluation of Tanks 101 and 102 and other existing components located in the 219-S Waste Handling Facility. This report will be included in the Part B Permit for the 222-S Laboratory and is a portion of the integrity assessment of the overall 222-S Laboratory radioactive liquid waste disposal system. This IAR is prepared in accordance with WAC 173-303, *Dangerous Waste Regulations*; Section 640(2), "Assessment of Existing Tank Systems Integrity."(Reference 1).

1.2 History

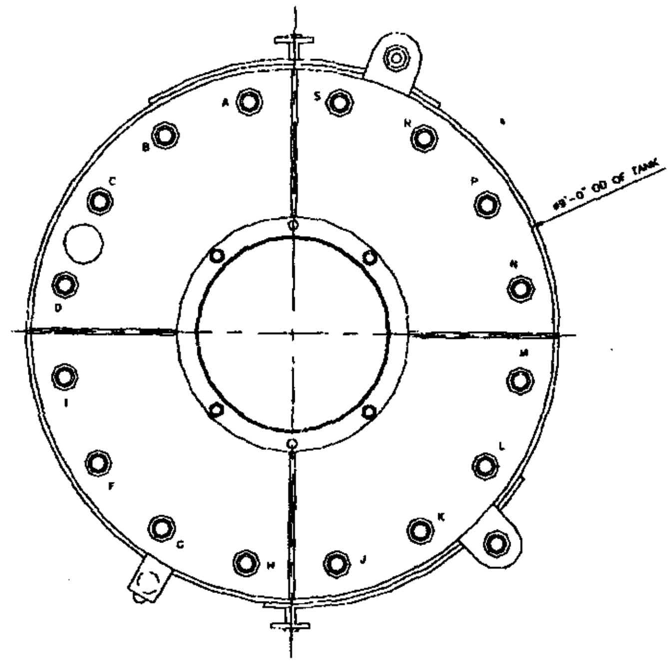
1.2.1 Original System Description

The 219-S Facility was built in the early 1950's and is part of the 222-S Laboratory radioactive liquid waste disposal system. The 219-S Facility originally consisted of three tanks (Tanks 101, 102, and 103) enclosed in an underground, epoxy-coated, concrete vault, interconnecting piping, an operating gallery, and sampling room. This vault was separated into two sections (Cell A and Cell B) with each section sloped to a sump equipped with a steam jet to remove waste and level instrument with an alarm. Tanks 101 and 103 collected waste from the laboratory through underground lines. When enough waste was collected, waste would be transferred to the third tank (Tank 102) via a steam jet system. In Tank 102, the pH and nitrite levels of the waste would be adjusted prior to transfer to the tank farms. Transfer to the tank farms was originally made through an underground line routed through REDOX. However, from 1989 to 1998, the waste transfers were made by a tanker trailer. The laboratory uses a large variety of chemicals. The most frequently used chemicals, which could corrode the stainless steel tanks, are hydrochloric acid, nitric acid, carbonate, hydroxide, fluoride, nitrite, sulfate, and phosphate.

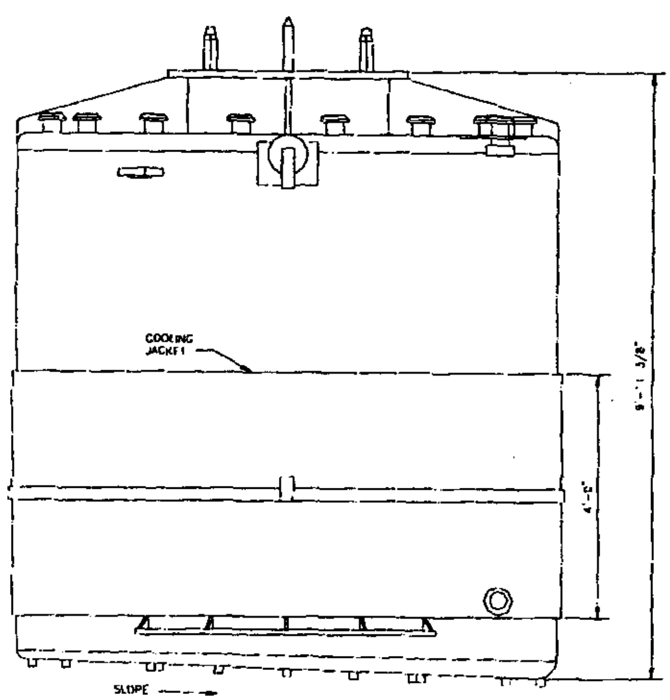
1.2.2 Tank Description

Tanks 101 and 102 are 4300 gallon (9 ft-0 in. diameter by 9 ft-8 in. tall) stainless steel tanks fabricated in 1943 for U Plant (see Reference 2). The U Plant work was canceled before the tanks were installed. The tanks were secured for the 219 S Facility and placed into service in 1951. Both tanks were built to ASME standards (non code stamped) from Type 347 stainless steel with a shell thickness of 0.5 inches. The tanks were fabricated from plate connected with full penetration welds. The welding was radiographed. Each tank is equipped with a cooling jacket that covers the lower half of the tank. The tanks are designed to be operated at atmospheric pressure. The high-level alarm on Tank 101 set at 3600 gallons and Tank 102 set at 3800 gallons. A sketch of the tanks is shown in Figure 1. When installed in 1951, Tank 102 (functioning as a chemical treatment tank) was equipped with an agitator. Tank 101 (functioning as a collection tank) was not equipped with an agitator.

Figure 1,
Sketch of Tanks 101 and 102



PLAN
TANK NO. 101 AND 102 ASSEMBLY
AGITATOR NOT SHOWN FOR CLARITY



ELEVATION

1.3 Current System Description

Radioactive liquid waste generated in the 222-S Laboratory enters into the collection system in the laboratory (i.e. hot cells, hoods, sumps, etc). The collection system is connected to a transfer system, which moves the waste to the 219-S Facility. There are four main transfer lines connected to the 219-S Facility. Two lines originate in the 11A hot cells and were installed by project W-041H. The other two lines were installed by project W-087; one line originates in the T8 tunnel and one line originates in the T4 tunnel. The collection and transfer lines are encased (pipe in pipe) piping equipped with leak detection. Waste from the 11A hot cells is collected in Tank 101 and waste from T8 and T4 is collected in Tank 104. Tank 104 was added by Project W-178, *219-S Secondary Containment Upgrade*. Once enough waste has accumulated in the collection tanks, the waste is transferred to Tank 102 for treatment. In Tank 102, the pH and nitrite levels of the waste are adjusted to meet tank farms waste acceptance criteria. The waste is transferred to tank farms by an air-operated pump and an underground transfer line (project W-087). The tanks are operated at a slight negative and vented through a HEPA filter. A sketch of the system is shown in Figure 2. The waste characteristics and tank operating parameters are shown in Table 1.

2.0 INTEGRITY OF TANKS 101 AND 102 AND EXISTING COMPONENTS OF THE 219-S FACILITY

The assessment of Tanks 101 and 102 will address the analytical design of the tanks, the current condition of the tanks, compatibility of the tank material with the waste to be stored or treated, and provide recommendations for future assessments. In addition, the assessment will address the components of 219-S Facility that will continue to be used in the tank system.

2.1 Analytical Analysis

Tanks 101 and 102 were fabricated from the same drawing (see Reference 2). Therefore, one analysis is adequate for both. An analysis was performed in 1990 as part the assessment for the 219-S Facility (see Reference 4, WHC-SD-CP-ER-030). The analysis was perform using the following codes and standards: SDC 4.1 (Reference 5), UCRL 15910 (Reference 6), UBC 1988 (Reference 7), ANSI/API 650 (Reference 8), and ASME Section VIII (Reference 9). These standards are still applicable. In the analysis, the tanks were evaluated for shell stresses, overturning stability, anchorage requirements, and nozzle reinforcement.

The results of the shell stress analysis demonstrates that the required wall thickness at the bottom of the tank is 0.062 inches and at the top of the tank 0.188 inches. The tanks were fabricated with shell thickness of the 0.5 inches. This shows that the tanks are over designed for the intended use. The additional thickness in the tank shell would allow for reduction due to corrosion.

The analysis showed the need for additional seismic restraints. These restraints were installed as part of project W-178. Seismic restraints were placed at the top and bottom of the tanks as shown in Figure 3. The analysis of the restraints is presented in calculation W-178-C02 (Reference 10). The analysis also demonstrated that nozzle reinforcement is not required.

Figure 2,
Waste Transfer System

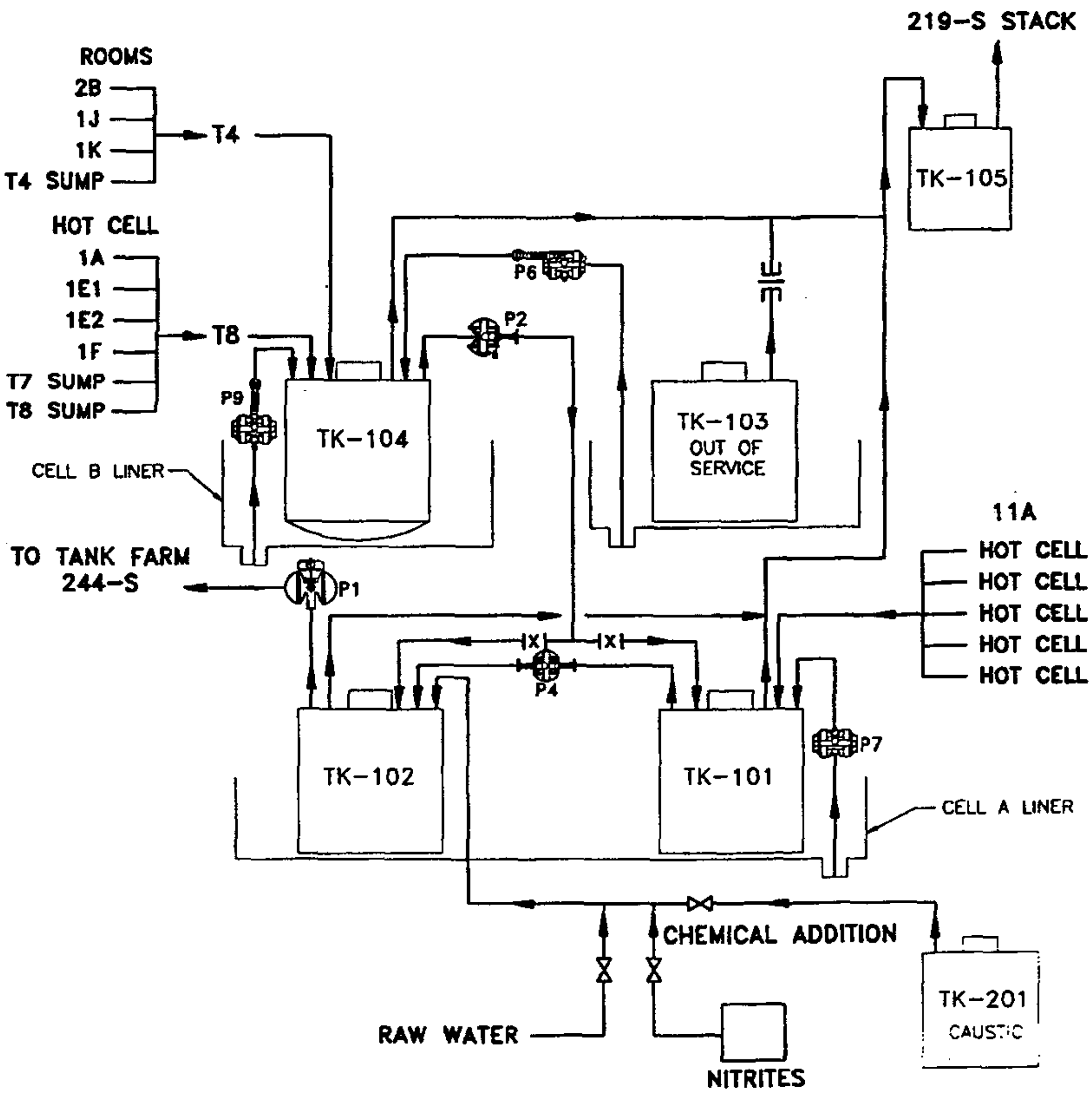


Table 1, Waste Characteristics and Tank Operation Parameters

Fluid Properties	Density	1.0 – 1.1 g/cc
	Viscosity	0.3 – 3.0 centipoise
	Solids Content	0.0 – 5.0 vol. %
	pH	0.5 – 14.0
Radioactive Materials	Total Alpha	$\leq$ 2.71E^{-3} Ci/l
	Total Beta	$\leq$ 1.18 Ci/l
	Strontium-89/90	$\leq$ 2.88E^{-1} Ci/l
	Cesium-137	$\leq$ 4.1E^{-1} Ci/l
	Uranium	$\leq$ 3.0E^{-1} Ci/l
	Plutonium	$\leq$ 2.0E^{-3} Ci/l I
Tank Operation Parameters	Operating Temperature	40°F – 220°F
	Operating Pressure (psi)	3.11 (Hydrostatic)
	Specific Gravity of Fluid - Design	.95 – 1.4

See Reference 3

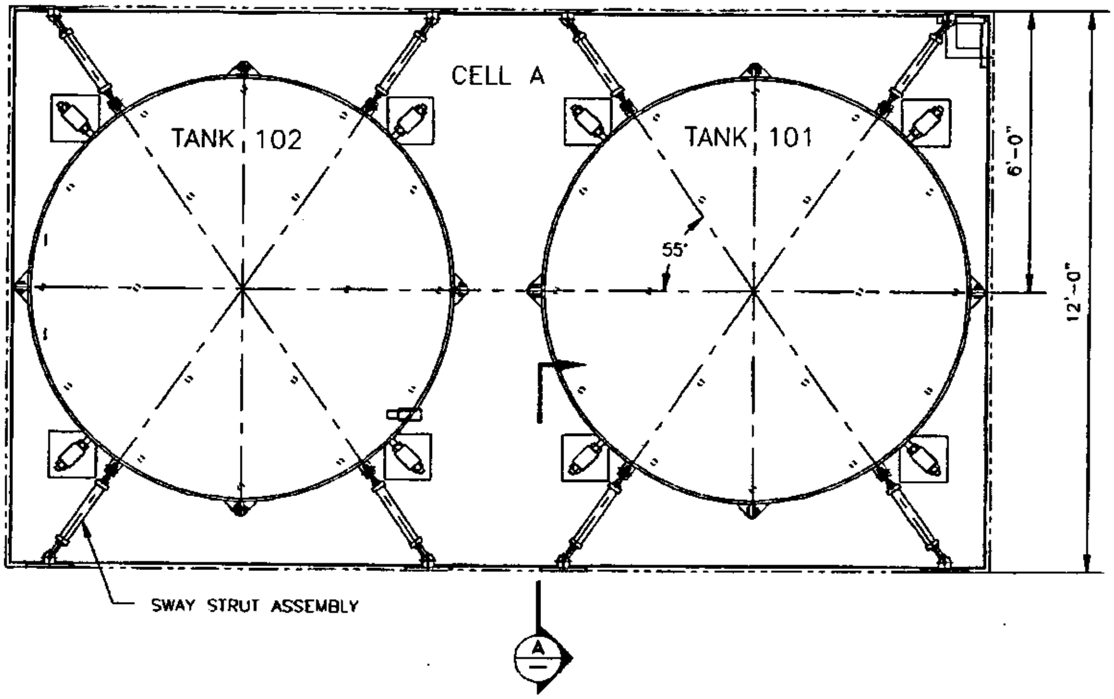
2.1.1 Tank Condition

The tank shell stresses analysis performed in 1990 shows that the tanks are over designed for the applied loads. Specifically, the analysis shows that the required thickness of the tank shell at the top of the tank should be 0.188 inches and at the bottom of the tank 0.062 inches. The thickness of the tanks when fabricated was 0.5 inches. To continue the use of the tanks, the tank shell condition must be evaluated. This was accomplished through two nondestructive inspection methods, a visual inspection and an ultrasonic test.

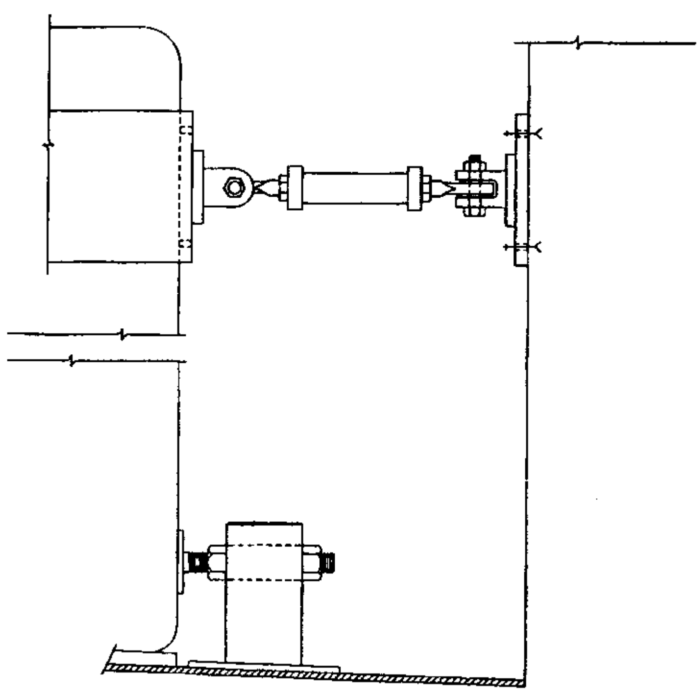
The tanks have been in service since 1951 and required cleaning prior to the inspection. Due to the lack of an agitator in Tank 101, solids accumulated in the tank both on the bottom and sides. The solids in the bottom of the tank were 4 to 6 inches deep and appeared to be fine sand or silt consistency mixed with laboratory debris (i.e. rubber stoppers, broken pipettes, etc). The solids on the bottom were loose and easily removed using a sluicing method with low-pressure water. The solids on the sides appeared to be a crust that adhered to the tank shell.

Tank 102 was equipped with an agitator to mix the waste after chemical addition. This agitation limited the accumulation of solids in the bottom of the tank. There was a build up of some substance, which had a strong bond on the sidewalls of the tank, probably due to years of pH and nitrite adjustments.

Figure 3,
Seismic Restraints for Tanks 101 and 102



PLAN



A SECTION
SCALE: 3"=1'-0"

2.1.1.1 Tank Cleaning

Three methods were used to remove the accumulated solids from the tanks. First, a high-pressure washer was used to remove solids from the sides. Second, low-pressure water was used to suspend the solids in solution while the solution was pumped out of the tank. Third, any solids remaining from method one and two were allowed to dry and were removed with a HEPA vacuum cleaner.

The approach to clean the tanks was to use the first two methods alternately to remove solids with a minimal amount of water. The high-pressure washer was a self-propelled device, which sprayed the water at 8000 psi. This was adequate to remove the crust from the sidewalls. A video of the inside of the tanks is available in the 222-S Laboratory regulatory file. Since the water used for cleaning created more waste, the tanks were only cleaned enough to facilitate the inspections.

2.1.1.2 Visual Inspection

The interior and exterior of the tanks were inspected, looking for areas that were discolored, cracked, or pitted. A Quality Control (QC) inspector performed a visual inspection of the tanks. QC inspector qualification information is located in Reference 11. Inspection of the tank interior was done using a video camera, since the radiological dose and contamination levels of the tank were too high for manned entry. The inspector saw what appeared to be some minor pitting in the video of the interior of the tank. However, when the same points are viewed with the camera at a different angle, the area of interest does not appear to be pitted. The inspector also found six areas with marks that are possibly cracks. There are five areas in Tank 101 and one area in Tank 102. When these points were viewed from a different camera angle, three of the marks in tank 101 could be dismissed. The pictures from the camera did not conclusively show the marks to be a crack. The marks might also be from a grinder during the original fabrication or a surface imperfection in the plate during the manufacturing process. Regardless of the origin of the marks they are not deep enough to cause the tank to fail or leak. See Reference 11 for the results of the visual inspection. The exterior of the tank was inspected, except for the area covered by the cooling jacket (see Figure 1). The results of the external examination show no defects on the tank shell.

2.1.1.3 Ultrasonic Testing

Ultrasonic testing (UT) was used to determine the thickness of the top, bottom, and sides of the tank shell. A qualified QC inspector following an approved procedure and using calibrated equipment performed UT testing (see Reference 11). Areas were selected at random for the UT. More than 150 measurements were taken on each tank with the minimum measurement being 0.48 inches (nominal 0.5 inches). The tank wall in the area under the cooling jacket was not measured since destructive removal of the cooling jacket would have been necessary to take the measurements. The decision not to remove the cooling jacket was made for the following reasons: first, the measurements taken demonstrate that the tank shell still has its original thickness; and second, the cooling jacket acts as an additional containment if the tank shell was to ever leak.

2.2 Waste Compatibility

The tanks are constructed from Type 347 stainless steel. The results of the nondestructive testing have shown that this material is resistant to the waste stream and after 47 years of service, there is negligible reduction in the tank shell from corrosion. This is significant given that in the past, there was little control of the quantity and concentration for chemicals poured into the drain system. Today, the 222-S Laboratory has procedures that control the pouring of chemicals into the drain system, which would be detrimental to the stainless steel.

2.3 Ancillary Equipment

Only one section of pipe was reused in the system. This is the penetration between cell A and B, labeled nozzle 81. The spool piece was used in the system that transfers waste from Tank 104 and Tank 102. This nozzle was inspected prior to use and found to be acceptable. All other ancillary equipment is assessed in document HNF-4590 (see Reference 12).

2.4 Concrete Vault and Secondary Containment

Secondary containment is assessed in document HNF-4590 (see Reference 12). The concrete vault was not used as secondary containment due to the unknown information regarding the installation. The vault is in good condition without signs of deterioration due to age (i.e., spalling, cracking etc). The original coating is deteriorating, however the new stainless steel liners protect the concrete. The vault structure was analyzed in 1990 as part of the 219 S Facility assessment and is structurally adequate (see Reference 4).

2.5 Tank System Corrosion Assessment

Not applicable as none of the existing tanks or ancillary equipment comes in contact with the soil.

2.6 Disposition of Unfit-for-Use Tank Systems

Not applicable.

2.7 Extensive Repairs

No extensive repairs were made to either tank. A minor modification to the support posts were required. The original design and fabrication of the tank used nineteen, 2-inch diameter, stainless steel posts for support. These stainless steel posts were 1-4 inches long, with 6-inch diameter carbon steel plates welded to the end. The posts were evenly distributed on the bottom of the tank. The carbon steel plates required removal, due to the corrosion of the carbon steel and the incompatibility of carbon steel with the stainless steel liner installed by project W 178. The tanks were modified by cutting the 2-inch diameter supports off, above the carbon steel plates. This was done while the tanks were removed for installation of the secondary containment liner. The removal work was inspected by QC to ensure that the tank was not damaged. With the supports removed, the tanks are supported around the edge. This method of support was analyzed and found acceptable (see calculation W-178-C07, Reference 13).

3.0 CONCLUSION

3.1 Tank Condition

Tanks 101 and 102 are structurally sound with some possible small cracks and minor pitting. The UT correlates with the visual inspection that the tank shell and the welds are still a nominal 0.5 inches thick. The results demonstrate that, after 47 years of service, the waste placed in the tanks has not significantly degraded the tanks. Therefore, as long as the waste criteria or the operational parameters do not significantly change, it can be expected that the tanks will remain functional for the next 30 years without concern of a major structural failure. Any minor leaks that might occur in the next 30 years would be contained and detected in the new secondary containment and repair could be made.

3.2 Future Assessments

This assessment demonstrates that, after 47 years of service, the tanks are in excellent condition. The analysis performed in 1990 shows that a minimum tank shell thickness of 0.188 inches is all that is necessary to contain a full tank of waste. The information from these assessments demonstrates that there is no need for additional assessments of this magnitude for the tanks to operate for the next 30 years. Therefore, the recommendation from this assessment is that no further assessments or testing are required for the tanks to operate safely for the next 30 years.

4.0 STRUCTURAL INTEGRITY ASSESSMENT STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that the qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment for knowing violations.

STATE OF WASHINGTON
0027710
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 10/08/00

5.0 REFERENCES

1. WAC 173-303, Section 640, "Tank Systems", January 1998
"Dangerous Waste Regulations"

2. Drawing H-2-5233, Sheet 1, Rev 2
"Piping, WT-TK-101 & WT-TK-102 Modifications"

3. HNF-SD-W178-FDC-001, Rev 3, June 19, 1998
"Functional Design Criteria, 219-S Secondary Containment Upgrade"

4. WHC-SD-CP-ER-030, Rev 0, July 6, 1990
"219-S Aqueous Waste Disposal Facility Tank System Integrity Assessment Report"

5. Hanford Plant Standard, SDC 4.1, Rev. 11, 1989
"Architectural-Civil Design Criteria Design Loads for Facilities"

6. UCRL 15910, 1988
"Design and Evaluation Guidelines for Department of Energy (DOE) Facilities Subjected to Natural Phenomena Hazards"

7. UBC 1988, Uniform Building Code
"International Conference of Building Officials," Whittier, CA

8. ANSI/API 650, Rev. 1, 1984 Welded Steel Tanks for Oil Storage
"American Petroleum Institute," Washington, D.C.

9. ASME Section VIII, 1989, ASME Boiler Pressure Vessel Code
"American Society of Mechanical Engineers," New York, NY

10. Calculation W-178-C02, W-178, "219-S Secondary Containment Upgrade
Calculation Item: "Seismic Restraints for Tank 101 and Tank 102 and Cell A Liner"

11. HNF-4621, Rev 0, June 1999
"Data Report for the Integrity Assessment Report HNF-4589"

12. HNF-4590, Rev 0, June 1999
"Integrity Assessment Report for Project W-178"

13. Calculation W-178-C07, W-178, "219-S Secondary Containment Upgrade
Calculation Item: "Analysis of Tank With Curved Bottom"

APPENDIX 4B-2

219-S WASTE HANDLING FACILITY INTEGRITY ASSESSMENT REPORT DESIGN AND CONSTRUCTION NEW TANK SYSTEM AND COMPONENTS, JULY 1999, HNF-4590, REV. 0, WASTE MANAGEMENT FEDERAL SERVICES OF HANFORD, INC., RICHLAND, WASHINGTON

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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 620991

2. To: (Receiving Organization) Waste Management	3. From: (Originating Organization) Fluor Danial Northwest	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: W-178	6. Design Authority/Design Agent/Cog. Engr.: David S. McShane	7. Purchase Order No.: N/A
8. Originator Remarks: For Release		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 219-S
		12. Major Assm. Dwg. No.: N/A
11. Receiver Remarks:	11A. Design Baseline Document? (X) Yes ( ) No	13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-4590	ALL	0	219-S WASTE HANDLING FACILITY INTEGRITY ASSESSMENT REPORT DESIGN & CONSTRUCTION NEW TANK SYS. & COMPONENTS	E	2	1	6

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority L.D. Goodwin	[signature]		T6-04	1	1	M.A. Cahill	M A Cahill	6/28/99	T6-03
3	1	Design Agent D.S. McShane	D.S. McShane	6-23-99	B4-09	3		G.S. Chinnery			N1-29
		Cog. Eng.				3		M.S. Collins			A5-18
1	1	Cog. Mgr. S.L. Brey	[signature]		T6-04	3		222-S Regulatory File			T6-12
		QA						DOE/RL Reading Room			H2-53
		Safety						Central Files			B1-07
1	1	Env. K.M. Leonard	[signature]	6/28/99	T6-12						

18.	19.	20.	21. DOE APPROVAL (if required)
David McShane D.S. McShane 6-23-99 Signature of EDT Originator Date	M A Cahill M.A. Cahill 6/28/99 Authorized Representative for Receiving Organization Date	[signature] S.L. Brey 6/30/99 Design Authority/ Cognizant Manager Date	Ctrl No. ( ) Approved ( ) Approved w/comments ( ) Disapproved w/comments

BD-7400-172-2 (10/97) BD-7400-172-1

S

219-S Waste Handling Facility Integrity Assessment Report Design & Construction New Tank System and Components

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U.S. Department of Energy Contract DE-AC06-96RL13200

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HNF-4590, Rev. 0
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219-S WASTE HANDLING FACILITY

INTEGRITY ASSESSMENT REPORT

DESIGN & CONSTRUCTION

NEW TANK SYSTEM AND COMPONENTS

PROJECT W-178
219-S SECONDARY CONTAINMENT UPGRADE

Prepared for
Waste Management Hanford
Richland, Washington

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June 23, 1999

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FIGURES

TABLES

1.0 INTRODUCTION

1.1 General Comments

This assessment report satisfies the "design and installation of new tank systems or components" certification requirements for Washington Administrative Code (WAC) 173-303-640(3) for Project W-178, *"219-S Facility Secondary Containment Upgrade."*

This Integrity Assessment Report was prepared by ChemMet, Ltd., PC, with source material and some text provided by Fluor Daniel Northwest, for Waste Management Federal Services of Hanford, Inc. contractor to the U.S. Department of Energy Richland Operations Office, the 219-S Waste Handling Facility tank system owner.

The purpose of Project W-178 was to update the 219-S Facility tank system to comply with State of Washington and Federal environmental regulatory standards for secondary containment and leak detection for tank systems storing dangerous waste. The upgrades were substantial and the tank system will be evaluated as a new tank system except for components that were existing and reused. An Integrity Assessment Report (Reference 1) prepared by Fluor Daniel Northwest, addresses 219-S existing components (Tanks 101 and 102) that are being used as part of the new upgraded tank system.

The purpose of this report is to document an independent review of the tank system design to meet the requirements of Washington Administrative Code (WAC), Dangerous Waste Chapter 173-303-640(3)(a) (Reference 2). This report is also used to document an independent inspection of the tank system installation to meet the requirements of WAC 173-303-640(3)(c) through (h). Guidelines provided by FDH-1579, Rev. 0 (Reference 3) and Ecology Publication No. 94-114 (Reference 4) are followed in preparation of this report.

1.2 Scope

This report addresses the design and installation of the new tank system provided for during the upgrade of the 219-S Waste Handling Facility. The upgrades bring the 219-S Facility tank system into compliance with dangerous waste secondary containment and leak detection requirements. The major activities in the upgrade were the addition of secondary containment for the vault areas, examination of existing Tanks 101 and 102, installation of a new Tank 104 to replace Tank 103, and modernization of the transfer and instrumentation systems. Tank 103 was replaced only because it was more cost effective and feasible to install a new tank than to remove Tank 103, install a liner, and reinstall Tank 103. This report will be included in the Resource Conservation Recovery Act of 1976 (RCRA) Part B Permit Application for the 222-S Laboratory and is a portion of the integrity assessment of the overall 222-S Laboratory, Radioactive Liquid Waste Disposal System. This report does not address the design assessment of reused components of the 219-S Facility, i.e., Tanks 101 and 102. As mentioned above, a design integrity assessment has already been performed for these tanks.

1.3 System Description and Operation

1.3.1 Original System

The 219-S Facility was originally built in the early 1950's and is part of the 222-S Laboratory Radioactive Liquid Waste Disposal System. A 222-S Laboratory site plan showing the location of the 219-S Facility is included in Figure 1. The 219-S Facility originally consisted of three tanks (Tanks 101, 102, and 103) with interconnecting piping in an underground, epoxy-coated, concrete vault, an operating gallery, and sampling room. This vault was separated into two sections (Cell A and Cell B) with each section sloped to a sump equipped with a steam jet to remove waste and level instrument with an alarm. Tanks 101 and 103 collected waste from the laboratory through underground lines. When enough waste was collected, waste would be transferred to Tank 102 via a steam jet system. In Tank 102, the pH and nitrite levels of the waste would be adjusted prior to transfer to the Tank Farms. Transfer to the Tank Farms was originally made through an underground line routed through the Reduction and Oxidation Facility (REDOX). However, from 1989 to 1998, the waste transfers were made by tanker trailer to Tank Farms.

1.3.2 Current System

Currently, radioactive mixed waste liquids generated in the 222-S Laboratory enter into the collection system in the laboratory (i.e. hot cells, hoods, sumps, etc). The collection system is connected to a transfer system, which moves the waste to the 219-S Facility. There are four main transfer lines connected to the 219-S Facility. Two lines originate in the 11A Hot Cells and were installed by Project W-041H, "*222-S Environmental Hot Cell Expansion.*" The other two lines were installed by Project W-087, "*222-S Radioactive Liquid Waste Line Replacement.*" One of the Project W-087 lines originates in the T8 Tunnel; the other line originates in the T4 Tunnel. The collection and transfer lines are encased (pipe in pipe) piping equipped with leak detection. Waste from the 11A Hot Cells is collected in Tank 101 and waste from T8 and T4 is collected in the newly installed Tank 104. Tank 104 was added by Project W-178. Once enough waste has accumulated in the collection tanks, the waste is transferred to Tank 102 for treatment. In Tank 102, the pH and nitrite levels of the waste are adjusted to meet Tank Farms waste acceptance criteria. The waste is transferred to Tank Farms by an air-operated pump and an underground transfer line (Project W-087). The tanks are operated at a slight negative pressure and only vented through a HEPA filter system. A sketch of the general arrangement of the 219-S Facility is shown in Figure 2. Figure 3 shows the flow diagram of the upgraded system.

The 219-S Facility tank system and components added or modified by Project W-178 are as follows:

Stainless Steel Liners (Secondary Containment):

Two 304L stainless liners were installed. A small liner (7' X 7') for half of Cell B will supply secondary containment for Tank 104. A larger liner (12' X 21') for Cell A will supply secondary containment for Tanks 101 and 102. The liners are designed to contain 100% of the volume of the largest tank within each liner. Each liner has a sloped bottom with sump in the low corner to aid in the removal of liquids resulting from leaks, spills, or precipitation. Each liner sump is provided with a leak-detection system that is designed and operated so that it will alarm should the presence of liquids be detected. Each liner was fabricated into a single unit from 304L stainless steel and tested for leaks prior to being lowered by crane into the cell area. The space between the liners and the concrete walls was grouted.

Figure 1
222-S Laboratory Site Plan

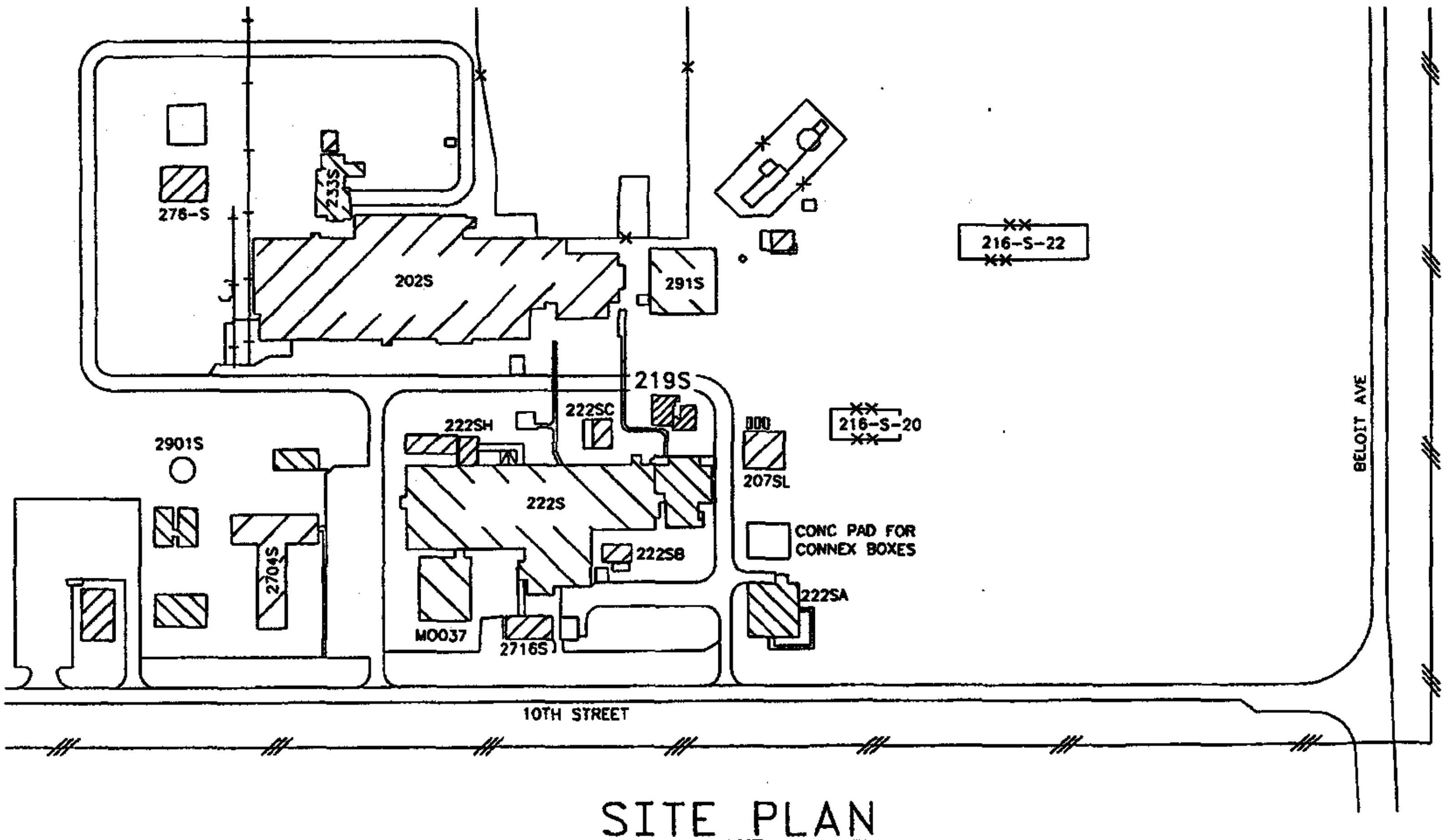
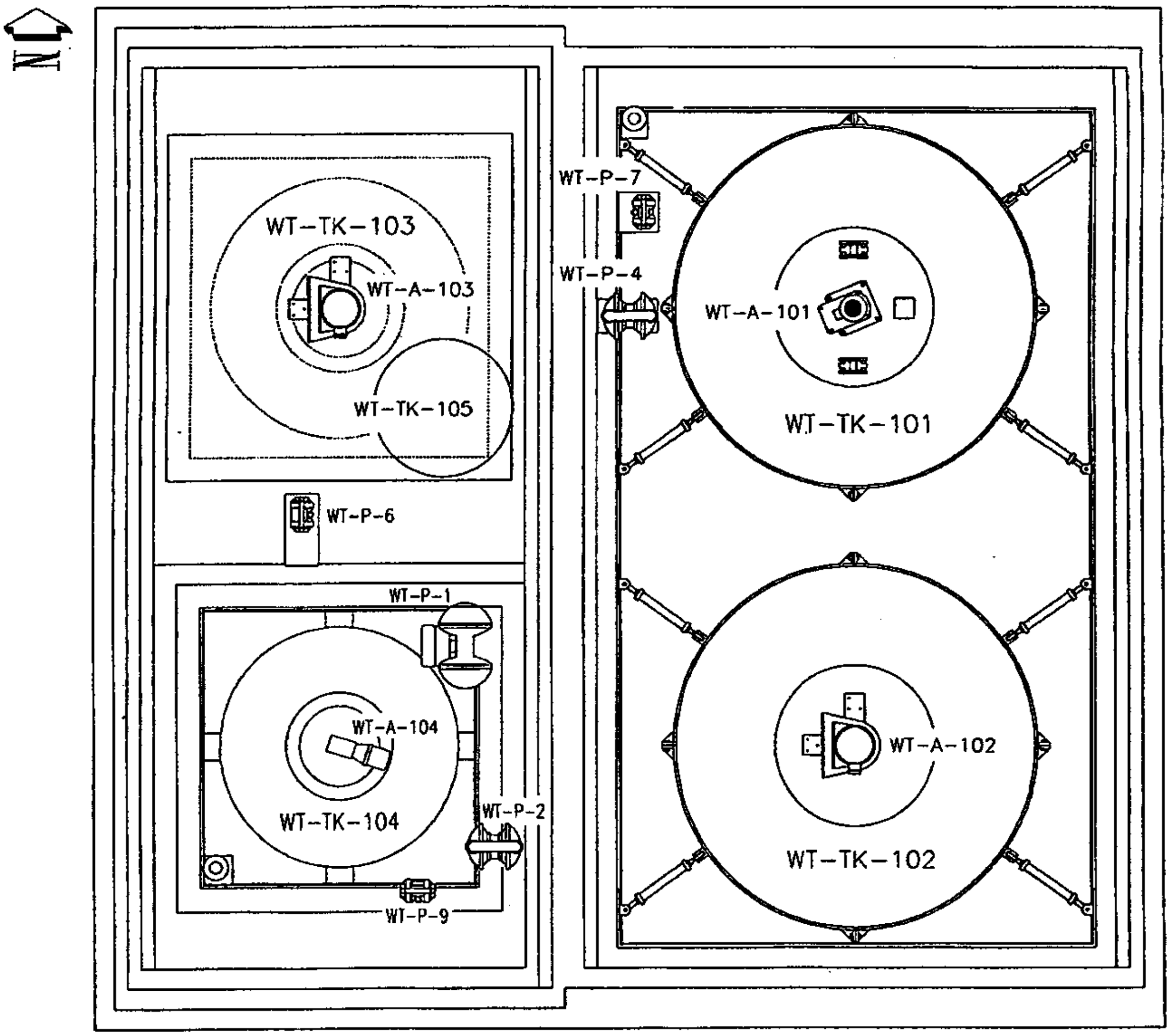
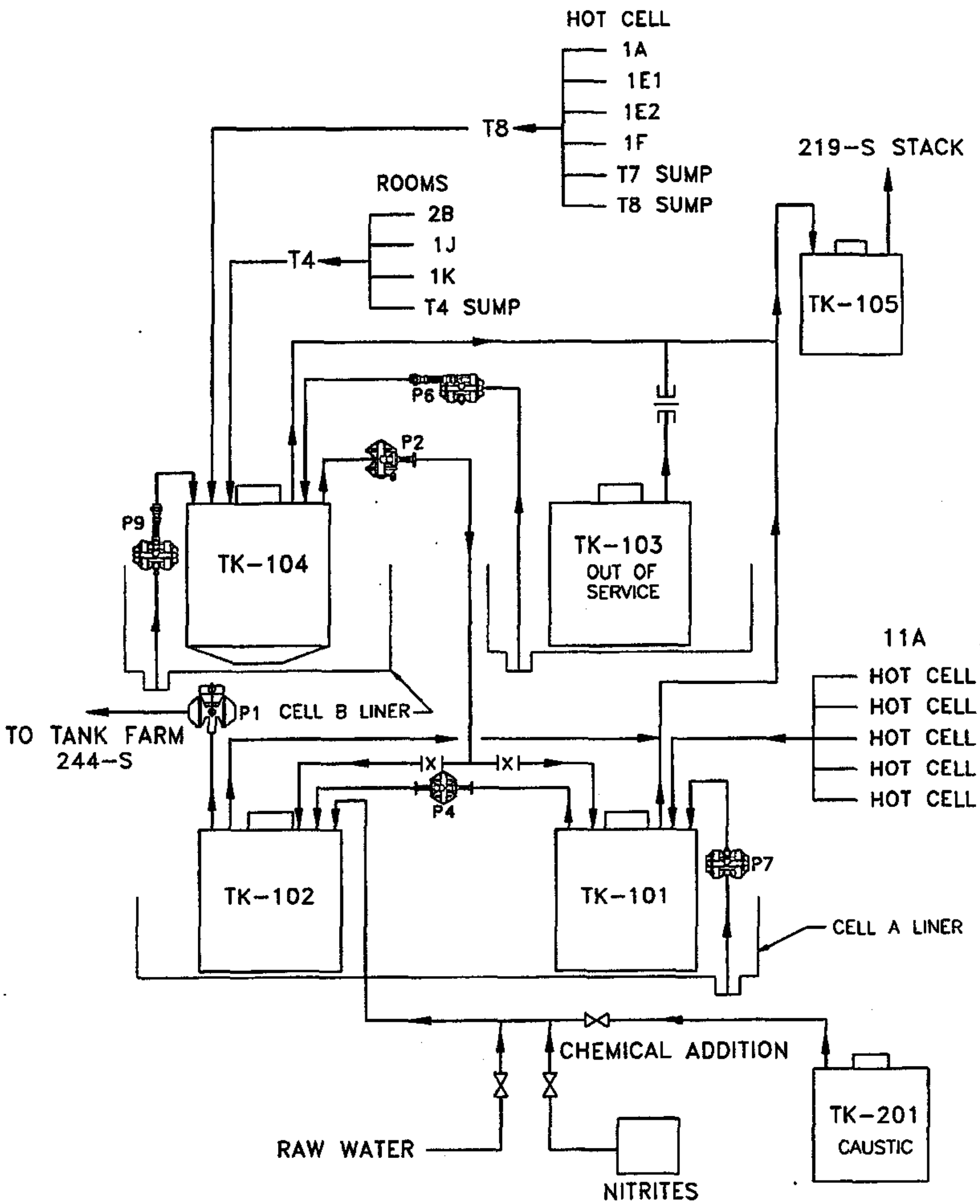


Figure 2
219-S Facility
General Arrangement



219-S CELL A & B PLAN

Figure 3
Waste Transfer System



Tanks (Primary Containment):

Tanks 101 and 102 are existing tanks, which were reused. These tanks were removed, inspected, and replaced in Cell A after the stainless steel liner was installed. The integrity assessment for Tanks 101 and 102 is contained in Reference 1. Tank 104 is a new tank, procured from an off site vendor (Reference 5). This tank has a capacity of 1900 gallons (6 ft.-0 in. diameter by 10 ft.-0 in. tall). Tank 104 was designed and constructed to American Society of Mechanical Engineers (ASME) Section VIII Standards from 304L stainless steel with a shell thickness of 5/16 inches. All three tanks are equipped with agitators, level and temperature instrumentation, and are seismically restrained. Tank 102 is also equipped with sampling and chemical treatment systems.

Sumps (Secondary Containment):

There are four sumps (i.e., sump #6, #7, #8, and #9) in the 219-S Facility. Two of these sumps (Sump #6 and #8) were not added or modified by Project W-178 but are discussed here for completeness of sump descriptions. Sump #6 collects liquids in the area under the out-of-service Tank 103. This tank's remaining heel, of 15 gallons or less, is expected to evaporate quickly. Therefore, use of Sump #6 is anticipated to be strictly for the removal of precipitation that may enter the Tank 103 concrete pit. Sump #7 is in the northwest corner of the Cell A liner and serves as a collection point for Tanks 101 and 102 and Cell A ancillary piping. Sump #8 is located in the operating gallery and serves as a collection point for the caustic and nitrite makeup tanks. Neither the caustic tank, nitrite makeup tank, nor Sump #8 are subject to dangerous waste tank system regulations and are, again, mentioned here for completeness only. Sump #9 is in the southwest corner of the Cell B liner and serves as a collection point for tank 104 and Cell B ancillary piping.

All of the sumps are equipped with a leak detector, which is connected to an alarm on Instrument Panel IP3 in the 219-S Facility operating gallery and an alarm in 222-S Laboratory room 3B. Each sump is equipped with an air-operated sump pump to transfer any waste collect to an appropriate tank. Control of the pumps is also on Instrument Panel IP3.

Liquids collected in Sump #6 and #9 are transferred to Tank 104. Sump #7 liquids are transferred to Tank 101 and Sump #8 liquids are transferred to the 207-SL basin (a non-dangerous waste basin). The pumps are operated from the 219-S Facility operating gallery by turning the appropriate switch on Instrument Panel IP3. The sumps are sized such that a leak of less than one gallon will activate the alarm. After operation of the sump pump a small residual amount of liquid would flow back into the sump from the suction leg of the pump. This liquid would remain in the sump. The lowest level leak detection sensor is located just above this level. Sump volume levels are located in Table 1.

Table 1, Sump Volumes

Sump Number	Volume after pumping (gals)	Volume at low level leak (gals)	Volume at mid level leak (gals)	Volume at high level leak (gals)
P6	0.83	1.40	6.67	No Detector
P7	0.34	1.11	2.22	41.92
P8	0.20	0.78	3.75	4.37
P9	0.61	1.11	2.22	35.64

Interconnecting Piping (Ancillary Piping):

New piping systems were installed to allow waste transfers from Tank 104 to Tanks 101 or 102, from Tank 101 to Tank 102, and from each sump. Additional piping was installed to connect 219-S Facility tanks to underground transfer lines (installed by Project W-087) from the 222-S Laboratory and to Tank Farms. All piping is of seamless construction and is made from Type 304L stainless steel.

The majority of the 219-S Facility piping is provided secondary containment by the tank cell liners. However, a section of piping, between Tunnel T4 and Cell B, is not entirely routed in such a way as to make use of the Cell B liner. In this area, the piping is provided with a secondary containment jacket that drains to the Tank 104 secondary containment. The tank leak detection system also provides leak detection capability for the ancillary piping. Flanged connections on all waste transfer pipe lines are required to have Teflon gaskets.

Level Instrumentation:

Tank 104 is equipped with level instrumentation. The level instrument is a bubbler type, which automatically compensates for specific gravity. The instrument is connected to a recorder which tracks tank volume and has a high level alarm to prevent overfilling of the tank.

Other Systems affected by Project W-178:

Two systems were disconnected to facilitate the removal of the Tanks 101 and 102, and were reinstalled after the tanks were in place. These systems were the chemical addition and sampling systems connected to Tank 102.

Isolation of Tank 103:

Tank 103 was isolated and taken out of service at the end of the project. Prior to emptying the tank, a RCRA protocol sample was obtained with the results placed in the facility operating record. The inventory of the tank was transferred to Tank Farms and a 500 gallon flush of water was used to reduce radiation exposure to personnel performing isolation activities. All piping was disconnected and a pressure relief valve installed on one of the tank nozzles.

1.4 Comments on Certification

Paragraph 3.0 contains the certification statement attesting to the accuracy of the information presented in this report. The certification statement is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE) in accordance with WAC-173-303-810(13)(a).

2.0 ASSESSMENTS

Section 2.1 discusses specific considerations for the design assessment. Section 2.2 discusses additional material associated with the construction assessment.

2.1 Design Assessment

The design assessment is based on the applicable codes, standards, design, and construction documents. Design documents include the Functional Design Criteria (Reference 6), the initial *219-S Aqueous Waste Disposal Facility Tank System Integrity Assessment Report* (Reference 7), calculations (Reference 8), and the project drawings (Reference 9).

The tank system described in section 1.3 of this report is adequately designed to prevent failure caused:

- by corrosion, provided proper operational and maintenance controls are placed into effect, or
- by structural loads imposed by the system's intended service.

Selected design calculations were examined and found satisfactory. All calculations were observed to have been prepared, reviewed, and approved by licensed professional engineers.

2.1.1 Design Codes and Standards

Hanford Plant Standard, SDC 4.1
"*Architectural-Civil Design Criteria Design Loads for Facilities,*" Rev. 11, 1989

UCRL 15910 *Design and Evaluation Guidelines for Department of Energy (DOE) Facilities Subjected to Natural Phenomena Hazards*

UBC 1994, "*Uniform Building Code*", International Conference of Building Officials, Whittier, CA

ASME Section VIII, 1989, *ASME Boiler Pressure Vessel Code*,
American Society of Mechanical Engineers, New York, NY

ASME/ANSI B31.3-96, American National Standards Institute, 1996
"*Chemical Plant and Petroleum Refinery Piping*"

AWS D1.1, 1994, American Welding Society
"*Structural Welding Code – Steel*"

2.1.2 Waste Characteristics

Over the effective life of this integrity assessment, it is not possible to predict the complete makeup of the waste streams that will be placed into the 219-S Facility tank system. The waste streams generated in the performance of the 222-S Laboratory are very complex and variable. In the absence of a fully characterized waste stream, this integrity assessment focused on ensuring that the 222-S Laboratory has administrative controls in place to ensure that incompatible wastes are not placed in the 219-S Facility tank system.

This integrity assessment examined two aspects of compatibility control; chemical compatibility and system compatibility. Chemical compatibility addresses the potential for chemicals from different waste streams to react within the system and cause an explosion, a release of toxic fumes, etc. System compatibility addresses the potential for a waste stream to corrode or degrade a 219-S Facility tank system component.

Several procedures are integral to the control of both chemical and system compatibility. In summary, many 222-S Laboratory procedures allow laboratory personnel to place liquids into the 219-S Facility tank system. However, each of those procedures requires the Shift Operations Manager's (SOM) approval before any liquids are placed into the 219-S Facility tank system. Before the approval is given to add liquids to the tank system, a procedure requires the SOM to verify that there is space in the tank system, and that the liquid is compatible with the tank system (Reference 10). A compatibility assessment was developed as the technical basis for determining if a waste is prohibited, i.e. if a waste might corrode or degrade an exposed tank system component. The assessment contains a table that lists each of the tank system components, and the chemicals/concentrations/conditions that harm those components. If the SOM determines that the waste/chemicals/concentrations/conditions are incompatible with a component of the tank system, the SOM will not grant approval for disposal to the 219-S Facility tank system.

All tanks, liners, piping and gasket materials are constructed of materials that are compatible with the waste given the procedural controls described above.

2.1.3 Corrosion Protection Determination

There are no external metal tank system components in contact with the soil or water.

2.1.4 Vehicular Traffic

There is no impact to the tank system due to vehicular traffic.

2.1.5 Tank Foundation

The liners were placed on the existing concrete floors of the vault. Prior to installation the areas were cleaned and inspected for structural damage.

2.1.6 Tank System Flotation or Dislodgment

The liners have sufficient structural strength and thickness to prevent failure. The design of the liners is supported by calculations (References 11 and 12). The piping stress calculations included an evaluation of the effects of seismic events according to the codes shown in Section 2.1.1 above. The calculations listed in Reference 8 qualify the tanks, liners, and ancillary equipment for any applicable loading including seismic. Seismic restraints and the secondary containment leak detection system provide tank flotation safeguards.

2.1.7 Effects of Frost Heave

There are no new external systems. The existing facility has operated for 47 years with no problems caused by frost heave. No change in performance is expected.

2.2 Construction Assessment

The construction assessment is based upon inspections performed by qualified Fluor Daniel Northwest (FDNW) Quality Control (QC) inspectors. The FDNW QC inspectors functioned as the IQRPE's representative at the construction site. In addition, Fluor Daniel Hanford Quality Assurance Acceptance Inspection (AI) provides acceptance inspection for the government. The IQRPE performed walk-throughs and discussed the construction with the inspection staff. Documentation of the inspections performed are compiled in the Process Control Packages (PCP) (References 13, 14, and 15); Construction Work Package (CWP) W-178-04 (Reference 16); and Acceptance Inspection (AI) Plans (References 17 through 21). The PCP, CWP, and AI plans exceed the requirements of WAC 173-303-640(3)(c) through (g). A discussion of the installation inspections specifically required by the referenced WAC tank system regulations follows.

2.2.1 General Inspections

Inspections were performed to determine if any structural damage occurred during the installation phase and to assess the quality of workmanship. Inspection personnel were present on site to verify that correct materials and procedures were used for the following activities:

- Visual inspection and pressure testing;
- Vault structural inspection prior to liner placement;
- Placement of anchor bolts for seismic supports, liner restraints and pipe supports;
- Grout placement behind liner;
- Placement of shop-fabricated and existing tanks;
- Installation of secondary containment liners;
- Installation of piping, pumps, and other ancillary equipment;
- Tightness testing prior to placing the tank system in service.

2.2.1.1 Weld Breaks

Welders qualified to the requirements of ASME/ANSI B31.3 using qualified weld procedures performed all welding. Inspection of the welds was to the ASME/ANSI B31.3 standards and included a final visual inspection of all welds and an in-process inspection of a representative number of welds. The inspection process was supervised by an American Welding Society (AWS) QC1 certified Weld Inspector, supplied by FDNW QC. All welds passed the inspection process with no weld breaks detected.

2.2.1.2 Punctures

The piping pneumatic pressure tests indicate that none exist.

2.2.1.3 Damage to Protective Coatings

Not Applicable. No protective coatings were required.

2.2.1.4 Cracks

Based on the inspections performed, cracks were not apparent in the concrete structure, liners, tanks, or ancillary equipment.

2.2.1.5 Corrosion

The systems described in Section 1.3 of this report are adequately designed to prevent failure caused by corrosion, provided proper operational and maintenance controls are placed into effect. The system is well designed to minimize external corrosion. Because of the presence of galvanized supports above the stainless steel components, precautions are required to ensure no fires can occur that will melt the zinc galvanizing and cause liquid metal embrittlement of the stainless steel.

2.2.1.6 Other Installation Information

Tank 104 was fabricated to ASME Section VIII Standards. Section 5.0, Reference 5 contains the manufactures data report for the fabrication of the tank. In addition a Kaiser Engineer's Hanford Acceptance Inspection inspector performed an overview of the fabricators QA plan to assure that the tank would be built to the proper requirements. Section 5.0, Reference 1 contains the inspection assessment for Tanks 101 and 102.

Based on this inspection, performed during construction, no structural damage is evident.

The secondary containment liners were made from Type 304L stainless steel. Welders and the weld procedures used in liner fabrication were both qualified to AWS D 1.1 (Reference 22). A final visual inspection was made on the welds prior to leak testing the liners. FDNW QC and AI witnessed the leak testing. Documentation is found in CWP W-178-04 (Reference 16) and in the AI plans IP-W-178-C2-1 and IP-W-178-2 (References 19 and 21).

2.2.2 Backfill Material

Not Applicable as the tank system is housed within the 219-S Facility vault.

2.2.3 Tightness Testing

A hydrostatic test of Tank 104 was conducted to demonstrate tank tightness. There were no water leaks observed during the test. Piping between cell wall penetrations and tank nozzles had to be installed in sections. These sections are commonly referred to as "spool pieces" and were fabricated by Hanford workers at a shop in the 200W area. The spool pieces were inspected and tested in the fabrication shop prior to installation at the 219-S Facility. The piping was installed in accordance with FDNW procedures and the installation inspected. Because of the operating configuration of the system, it was not possible to perform a standard pressure test after the spool pieces were installed at the tie-in points (e.g. where a spool piece ties into a nozzle). The tie-in points are flanged connections that were gasketed with bolts torqued to manufacturer's recommendations. As an added precaution, each of these tie-in points was sleeved in plastic to contain any possible leaks during initial startup of the system. This was done to minimize the potential of radiation contamination of the cell liner should a leak occur and not for secondary containment as secondary containment already exists. The tightness will be verified via in-service testing of the piping with process liquids.

2.2.4 Ancillary Equipment Support

All ancillary equipment has been adequately supported and protected to prevent physical damage and excessive stresses due to settlement, vibration, expansion and contraction.

2.2.5 Corrosion Protection Systems

Not applicable as none of the external metal tanks or ancillary piping comes in contact with the soil, or water.

2.2.6 Documentation of Inspection Results

Documentation of the inspections performed are compiled in the Process Control Packages (PCP) (References 13, 14, and 15); Construction Work Package (CWP) W-178-04 (Reference 16); and Acceptance Inspection (AI) Plans (References 17 through 21).

3.0 CONCLUSION

The 219-S Facility tank system has been adequately designed, has sufficient structural strength, is compatibility with the waste to be handled, and has corrosion protection, to ensure that it will not collapse, rupture, or fail, given that the waste control procedures are maintained and the tank system is not exposed to unacceptable conditions. Furthermore, proper installation procedures were followed to prevent damage to this tank system during installation.

Future detailed assessments of the tank system as performed in 1990 and 1999 need not be as frequent. Indeed, is it very probable that the tank system can be safely operated for the next 30 years. Nevertheless, periodic visual inspections, as allowed by principles to minimize radiation exposure to workers, should be performed whenever possible to ensure continued integrity.

4.0 STRUCTURAL INTEGRITY ASSESSMENT CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared or collected under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

JAMES R. DIVINE
STATE OF WASHINGTON
12231
REGISTERED
PROFESSIONAL ENGINEER

23 Jan 99

EXPIRES: 3-11-00

5.0 REFERENCES

1. HNF-4589, Rev. 0, June 1999, David S McShane, Fluor Daniel Northwest
"Integrity Assessment Report of Tanks TK-101 and TK-102"

2. WAC 173-303- 640, *"Tank Systems"*, January 1998
"Dangerous Waste Regulations"

3. FDH-1579, Rev 0, Fluor Daniel Hanford
"Integrity Assessment Plans"

4. Publication No. 94-114, Washington State Department of Ecology, June 1994
"Guidance for Assessing and Certifying Tank Systems that Store and Treat Dangerous Waste"

5. Certified Vendor Information Number 22711 Supplement 2,
Flohr Metal Fabricators, Inc., Seattle WA, 1/18/96

6. HNF-SD-W178-FDC-001, Rev 3, June 19, 1998
"Functional Design Criteria, 219-S Secondary Containment Upgrade"

7. WHC-SD-CP-ER-030, Rev 0, July 6, 1990
"219-S Aqueous Waste Disposal Facility Tank System Integrity Assessment Report"

8. Calculation Log, W-178, "219-S Secondary Containment Upgrade," D. S. McShane

9. Hanford Drawing H-2-829169, Project W-178, "219-S Secondary Containment Upgrade"
"Drawing List/Area Map"

10. HNF-4704, Rev 0, June 1999, Larry D. Goodwin, Waste Management Hanford
"219-S Chemical Compatibility"

11. Calculation W-178-C01, W-178, "219-S Secondary Containment Upgrade"
Calculation Item: *"Seismic restraints for Tank 104 and Cell B liner"*

12. Calculation W-178-C02, W-178, "219-S Secondary Containment Upgrade"
Calculation Item: *"Seismic restraints for Tanks 101 & 102 and Cell A & B liner"*

13. PCP W-178-01, Rev 0, *"Process Control Package"*
"Installation of Liner and Tank 104 into Cell B in support of Project W-178 Secondary Containment Upgrade 219-S Facility"

14. PCP W-178-02, Rev 0, *"Process Control Package"*
"Phase One Piping and Mechanical Fabrication/Installation for Project W-178 Secondary Containment Upgrade Building 219-S"

15. PCP W-178-03, Rev 0, *"Process Control Package"*
"Phase One Electrical Fabrication/Installation for Project W-178 Secondary Containment Upgrade Building 219-S"

16. CWP W-178-04, Rev 0, *"Construction Work Package"*
    "Installation of the Secondary Containment Upgrades at 219-S Project W-178"

17. IP-W-178-C1-1, Rev 0, *"Inspection Plan"*
    "219-S Secondary Containment Upgrade (Instrumentation-Shop fabrication of panels IP1, IP2, and IP3 Spec. Sec. - 13440)"

18. IP-W-178-C1-2, Rev 0, *"Inspection Plan"*
    "219-S Secondary Containment Upgrade"

19. IP-W-178-C2-1, Rev 0, *"Inspection Plan"*
    "219-S Secondary Containment Upgrade"

20. IP-W-178-P1-1, Rev 0, *"Inspection Plan"*
    "219-S Double Containment Upgrade (Offsite fabrication of a atmospheric tank)"

21. IP-W-178-2, Rev 0, *"Inspection Plan"*
    "219-S Secondary Containment Upgrade (Structural, Cell Liner B)"

22. AWS D.1.1, 1994, American Welding Society
    "Structural Welding Code – Steel"

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APPENDIX 4B-3

CONSOLIDATION OF INTEGRITY ASSESSMENTREPORTS PROJECT W-087, 1-E-2 HOT CELL (PROJECT W-251), AND ROOMS 1J AND 1K UPGRADES, JUNE 2000, HNF-4737, FLUOR HANFORD, RICHLAND, WASHINGTON.

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Sta #(2) S

DOE/RL-27, Rev. 2
09/2006

JUL 10 2000

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 621013

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Waste Management	Fluor Federal Services	N/A
5. Proj./Prog./Dept./Div.: Project W-087	6. Design Authority/Design Agent/Cog. Engr.: David S. McShane	7. Purchase Order No.: N/A

8. Originator Remarks:
For Release

9. Equip./Component No.: N/A

10. System/Bldg./Facility: 222-S, 219-S

12. Major Assm. Dwg. No.: N/A

13. Permit/Permit Application No.: N/A

14. Required Response Date: N/A

11. Receiver Remarks:

11A. Design Baseline Document? ○ Yes ◉ No

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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-4737	ALL	0	Consolidation of Integrity Assessment Reports for Project W-087, 1-E-2 Hot Cell (Project W-251), and Rooms 1J & 1K Upgrades	E	2	1	6

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

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1	1	Design Authority L.L. Weaver	SBWeaver		T6-04	3		Central Files (Original)			A3-88
3		Design Agent D.S. McShane			B4-09	3		Central Files			A3-88
		Cog. Eng.				3		DOE/RL Reading Room			H2-53
1	1	Cog. Mgr. S.L. Brey	KB	6/20/00	T6-04	3		222-S Regulatory File			T6-16
		QA				3		A.G. Miskho			G1-37
		Safety	GBB	6/28/00							
1	1	Env. J.A. Winterhalder		6/20/00	T6-16						

18.	19.	20.	21. DOE APPROVAL (if required)
David McShane D.S. McShane 6-19-00 Signature of EDT Originator Date	N/A Authorized Representative for Receiving Organization Date	S.L. Brey 6/20/00 Design Authority/ Cognizant Manager Date	Ctrl No. ○ Approved ○ Approved w/comments ○ Disapproved w/comments

BD-7400-172-2 (10/97) BD-7400-172-1

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Revision 0

CONSOLIDATION OF INTEGRITY ASSESSMENT REPORTS FOR PROJECT W-087, 1-E-2 HOT CELL (PROJECT W-251), AND ROOMS 1J & 1K UPGRADES

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200
Fluor Hanford
P.O. Box 1000
Richland, Washington

HNF-4737
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David S McShane
Fluor Federal Services

Date Published
June 2000

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Richland, Washington

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CONSOLIDATION OF INTEGRITY ASSESSMENT REPORTS FOR PROJECT W-087, 1-E-2 HOT CELL (PROJECT W-251), AND ROOMS 1J & 1K UPGRADES

Prepared for
Waste Management Hanford

Prepared by
David S. McShane P.E.
Fluor Federal Services

June 2000

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FIGURES

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APPENDICES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Scope

This Integrity Assessment Report (IAR) was prepared by Fluor Federal Services (FFS) for Waste Management Federal Services of Hanford, Inc., (WMH), contractor to the U. S. Department of Energy (DOE), the system owner. This report will be included in the Resource Conservation Recovery Act of 1976 (RCRA) Part B Permit for the 222-S Analytical Laboratory and is a portion of the integrity assessment of the overall 222-S Laboratory Radioactive Liquid Waste Disposal System. This report will also be included in the RCRA Part B Permit for the Double Shell Tank (DST) Farms as it addresses a portion of the DST transfer system (see Section 2.1.1). Specifically this report addresses the renovations made by Project W-087, additions made by the upgrades to Rooms 1J and 1K, and the drain lines added with the construction of 1-E-2 Hot Cell. This IAR is prepared in accordance with Washington Administrative Code (WAC) 173-303, *Dangerous Waste Regulations*; (Reference 1) Section 640(2), "*Assessment of Existing Tank Systems Integrity*" and (3), "*Design and Installation of New Tank Systems or Components*".

1.1.1 Project W-087

Project W-087 "*222-S Radioactive Liquid Drain Line Replacement*" provided a major renovation of the radioactive waste collection and transfer system at the 222-S Laboratory. The upgrades comply with State of Washington and Federal environmental regulatory standards for secondary containment and leak detection for tank systems storing dangerous waste. This IAR consolidates the various Project W-087 IARs, and provides a crosswalk linking the W-087 assessments. In addition, this IAR addresses changes to and technical issues affecting the systems which changed after the issuance of the W-087 IARs.

1.1.2 Upgrades to Rooms 1J and 1K

Room 1J was upgraded in 1980 and Room 1K in 1995. As a part of these upgrades, new drain lines were installed. These drain lines are encased to provide secondary containment. Leak detection was added when the drain lines were tied into the new main drain line header installed as part of W-087. This report will assess these drain lines.

1.1.3 1-E-2 Hot Cell

The 1-E-2 Hot Cell was constructed in 1985 as part of Project W-251 "*Interim High Level Waste Characterization Laboratory*". The design of the hot cell included two encased gravity drain lines and one encased smaller slurp drain line. The smaller slurp line was abandoned in place in 1997. The gravity drain lines had leak detection added when the drain lines were tied into the new main drain line header installed as part of W-087. This report will assess these drain lines.

1.2 222-S Laboratory Radioactive Liquid Waste Disposal System Description

The 222-S Laboratory Radioactive Liquid Waste Disposal System consists of four sub-systems: 1) the collection system, 2) the transfer system from 222-S to 219-S, 3) the storage and treatment system, and 4) the transfer system from 219-S to 244-S Double Containment Receiver Tank (DCRT) (Tank Farms). Radioactive mixed waste liquids generated in the 222-S Analytical Laboratory enter into the collection system in the laboratory (i.e. hot cells, hoods, sumps, etc). The collection system is treatment system is in the 219-S facility. This system consists of two collection tanks (Tank 101 and 104), one treatment tank (Tank 102), transfer piping, a ventilation system, secondary containment, and leak detection. Waste from the 11A Hot Cells is collected in Tank 101 and waste from T8 and T4 is collected in Tank 104. Once enough waste has accumulated in the collection tanks, the waste is transferred to Tank 102 for treatment. In Tank 102, the pH and nitrite levels of the waste are adjusted to meet Tank Farms waste acceptance criteria. The waste is transferred to Tank Farms by the transfer system from 219-S to 244-S DCRT, which consists of an air-operated pump and an underground transfer line (including a spare line) equipped with leak detection.

The 222-S Laboratory Radioactive Liquid Waste Disposal System is has undergone multiple changes over the last twenty years. The changes were accomplished through four major projects and two room upgrades. While this IAR does not address the entire system, the following is a summary of the system changes and the projects that accomplished these changes. Figure 1 shows a flow diagram of the 222-S Radioactive Waste Disposal System and outlines the projects that provided the system changes.

1.2.1 Project W-041H – "222-S Environmental Hot Cell Expansion"

This project added the 11A Hot Cell and added the piping to the collection and transfer system from 222-S to 219-S. The project was constructed between 1992 and 1994 and was constructed to WAC and RCRA standards. The Integrity assessment for this portion of the 222-S Laboratory Radioactive Liquid Waste Disposal System is located in HNF-4849, "*222-S Environment Hot Cell Expansion Integrity Assessment Report – Design and Construction*" (Reference 2).

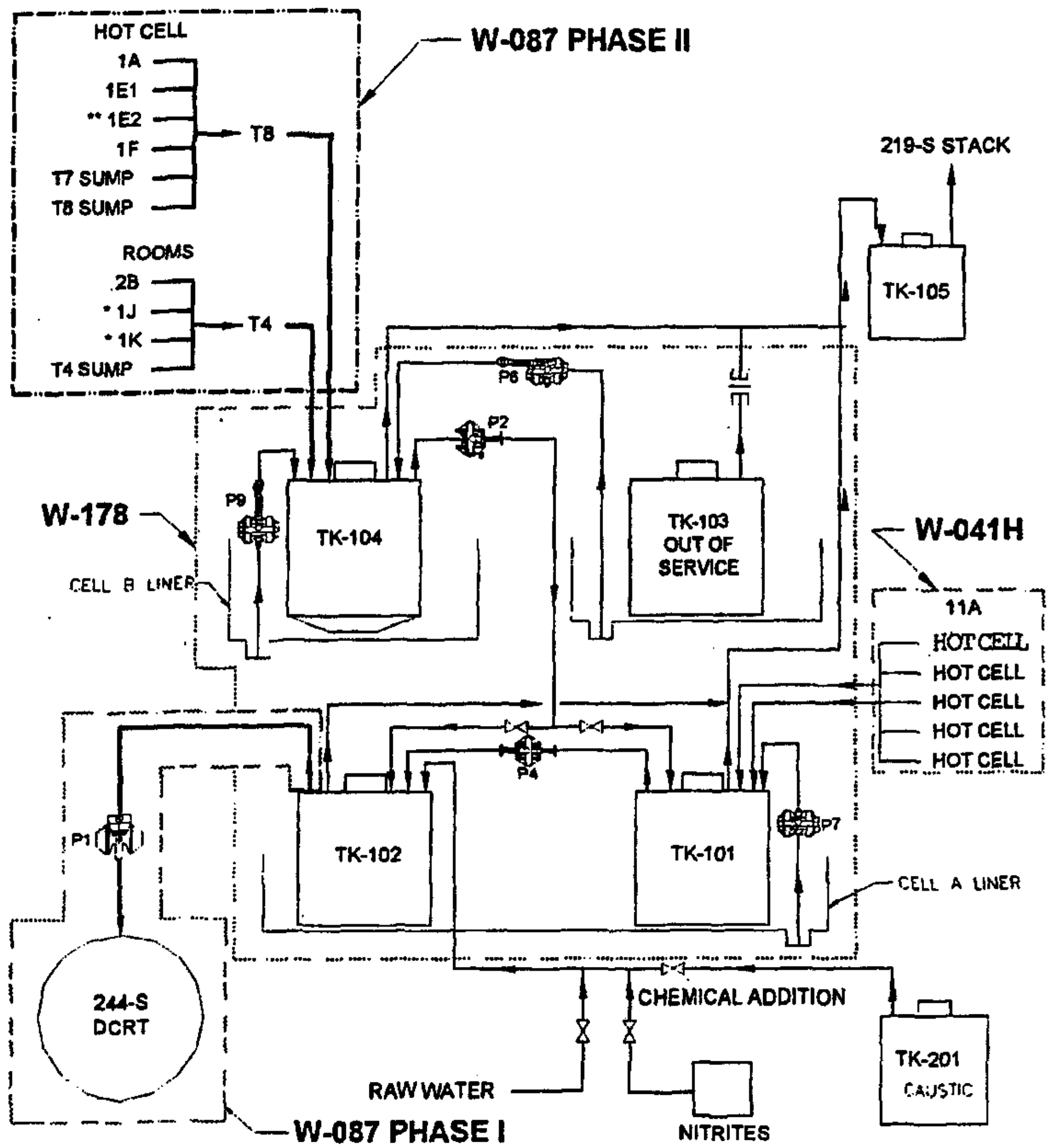
1.2.2 Project W-178 – "219-S Secondary Containment Upgrade"

This project renovated the storage and treatment system adding stainless steel liners to the 219-S facility, installing a new storage tank, renovating the interconnecting piping, and renovating the leak detection. This project was constructed between 1995 and 1999 and was designed and constructed to WAC and RCRA standards. The Integrity assessment for this portion of the 222-S Laboratory Radioactive Liquid Waste Disposal System is located in two reports, HNF-4589 "*Integrity Assessment Report of Tanks TK-101 and TK-102*" (Reference 3) and HNF-4590 "*219-S Waste Handling facility Integrity Assessment Report Design & Construction New Tank System and Components*" (Reference 4).

1.2.3 Project W-087 – "222-S Radioactive Liquid Waste Line Replacement"

Project W-087 was divided into two phases. Phase I replaced the existing transfer system from 219-S to 242-S with a new transfer pump and pipeline (spare included) and was constructed in 1995 and 1996. Phase II replaced the collection system in the T4 and T8 tunnel areas of the 222-S Analytical Laboratory and the transfer system between the T4 and T8 tunnels to the 219-S facility. Phase II was constructed between 1995 and 1999. Both Phases were designed and constructed to WAC and RCRA standards. The integrity assessments for this project are included in this consolidated report.

FIGURE 1
222-S Radioactive Waste Disposal System



* INSTALLED DURING ROOM UPGRADE
** INSTALLED BY PROJECT W-251

1.2.4 Project W-251 – "Interim High Level Waste Characterization Laboratory"

This project was constructed in 1985 and added the 1-E-2 Hot Cell, three drain lines were added to the collection system. Two of the three lines are still in use. The integrity assessments for this project are included in this report.

1.2.5 Rooms 1J and 1K upgrades

Room 1J was upgraded in 1980 with the addition of a new drain line to the collection system. 1K was upgraded in 1995 with the addition of a new drain line to the collection system. The integrity assessment for the upgrade of drain piping these rooms is included in this report.

2.0 INTEGRITY ASSESSEMENT OF PROJECT W-087

2.1 System Descriptions

2.1.1 Project W-087 Phase I (Transfer Line from 219-S to 244-S DCRT)

This portion of the tank system starts at Nozzle N of Tank 102 in the 219-S Facility. Waste is lifted through a diaphragm pump to the high point of a 3000-foot long, underground, fiberglass, encased, gravity fed transfer line which connects the 219-S Facility with the 244-S DCRT in the SY-Tank Farms. Phase I upgrade also installed a spare transfer line. Figures 2, 3, and 4 show the layout of the ancillary equipment. The IAR for the design of the transfer lines is contained in Appendix A. The IAR for the construction installation is in Appendix B.

The Phase I upgrades were performed for both SY Tank Farms and the 222-S Laboratories. The boundary between facilities is shown in Figure 3. Prior to startup the Facility/Contractor responsibilities and permit boundaries were defined in a "Memorandum of Understanding" (Attachment 1). This Memorandum transfers the responsibility of the Phase I transfer line (including the spare) from the 222-S Laboratories to the Tank Farms. Therefore, not all of the information in the W-087 Phase I IAR's (Appendix A and B) pertains to the 222-S Laboratory Radioactive Liquid Waste Disposal System.

2.1.2 Project W-087 Phase II (222-S Collection Lines and Transfer Lines from 222-S to 219-S)

Radioactive liquid waste generated in the 222-S Laboratory enters into the tank system at the laboratory point of origin (i.e. hot cells, hoods, sumps, etc). Waste from the laboratory front side and multi-curie wing flows into piping headers located in the T4, T7, and T8 Tunnels. These headers are connected to transfer lines, which transport the waste to the 219-S Facility. These transfer lines are encased (pipe-in-pipe) piping equipped with leak detection. A spare transfer line from the T4 and T8 Tunnels was also installed. Figures 5, 6, and 7 show the layout of this ancillary equipment. The IAR for the design of this portion of the system is in Appendix C. The IAR for the construction of the collection and transfer system from 222-S to 219-S is in Appendix D.

FIGURE 2
Project W-087 Phase I
Site Plan

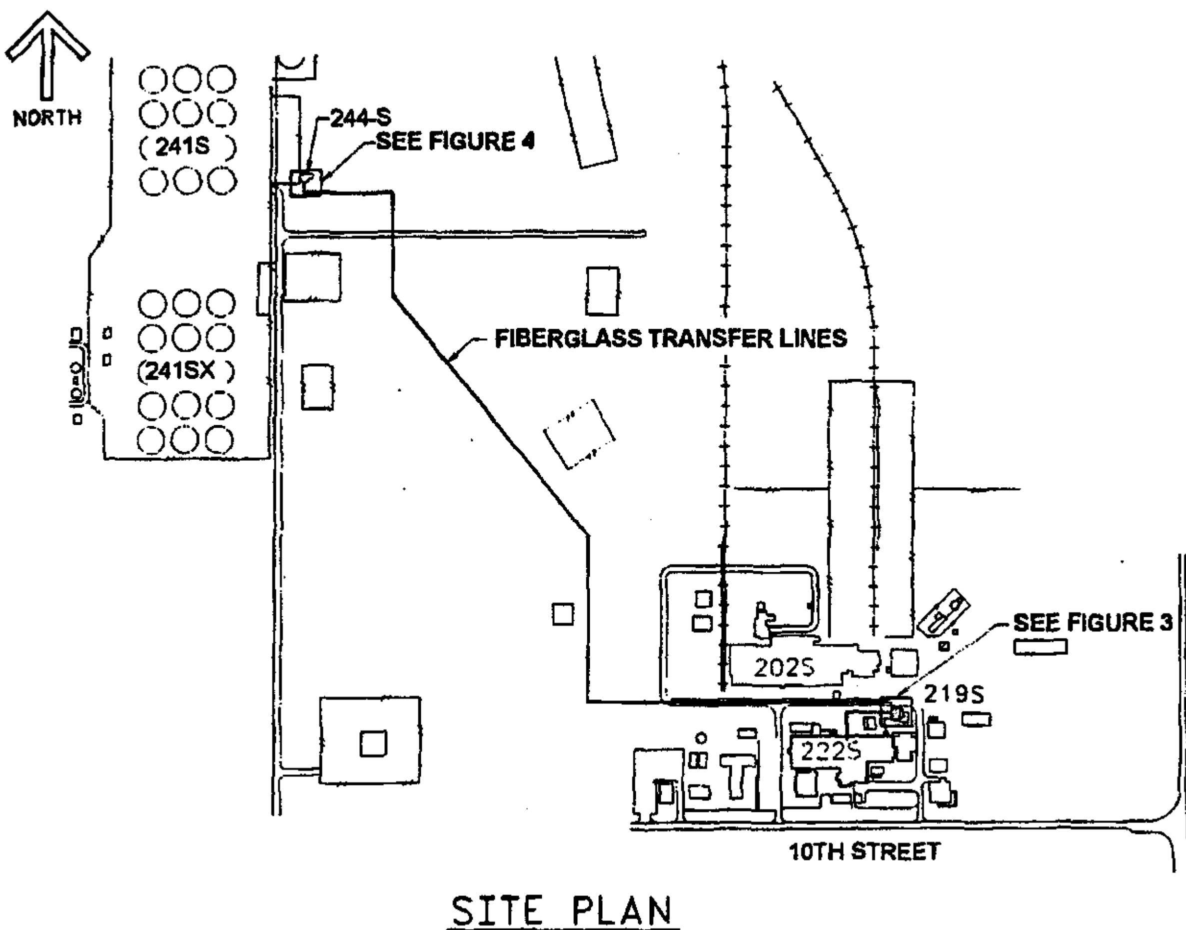
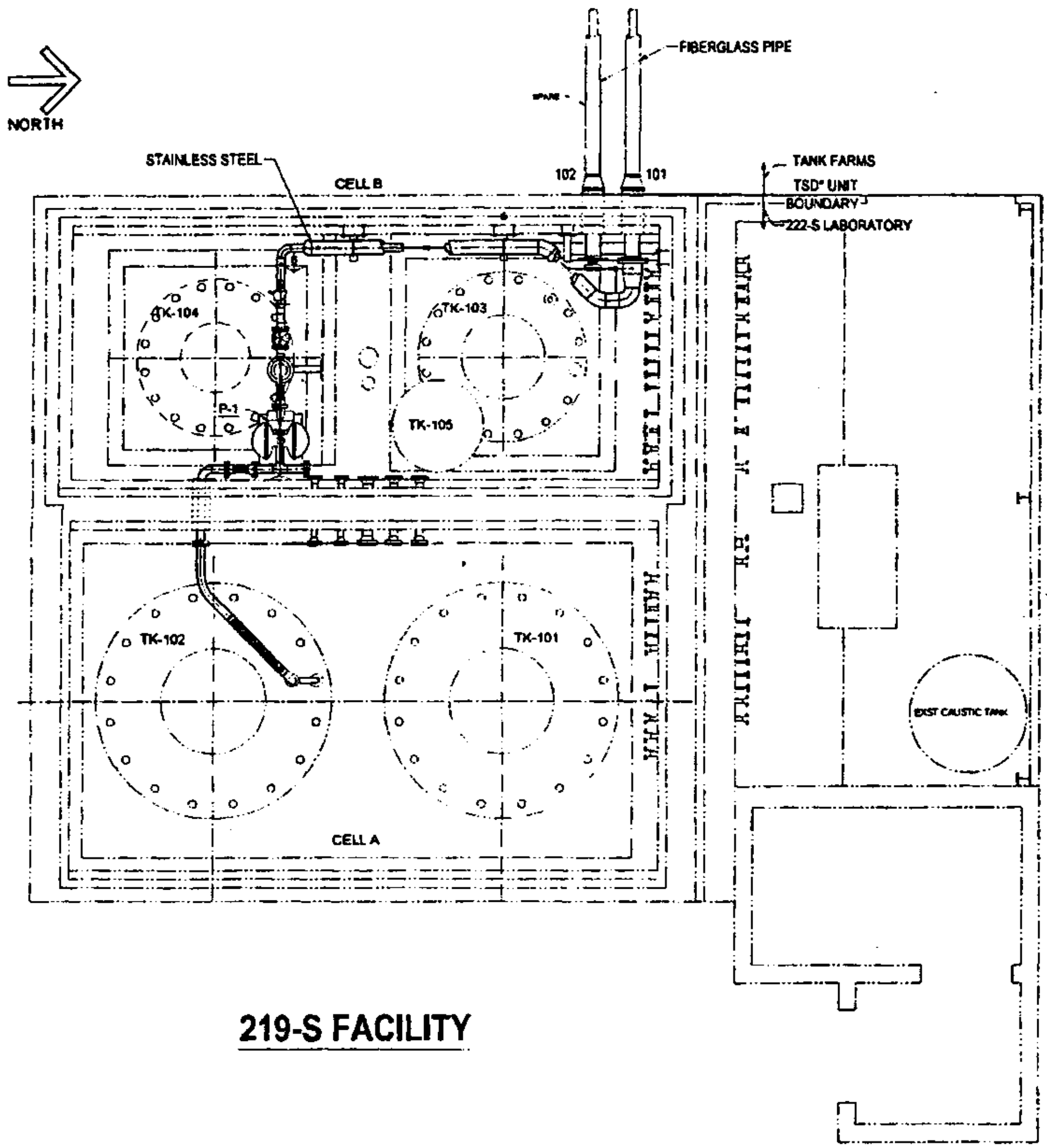
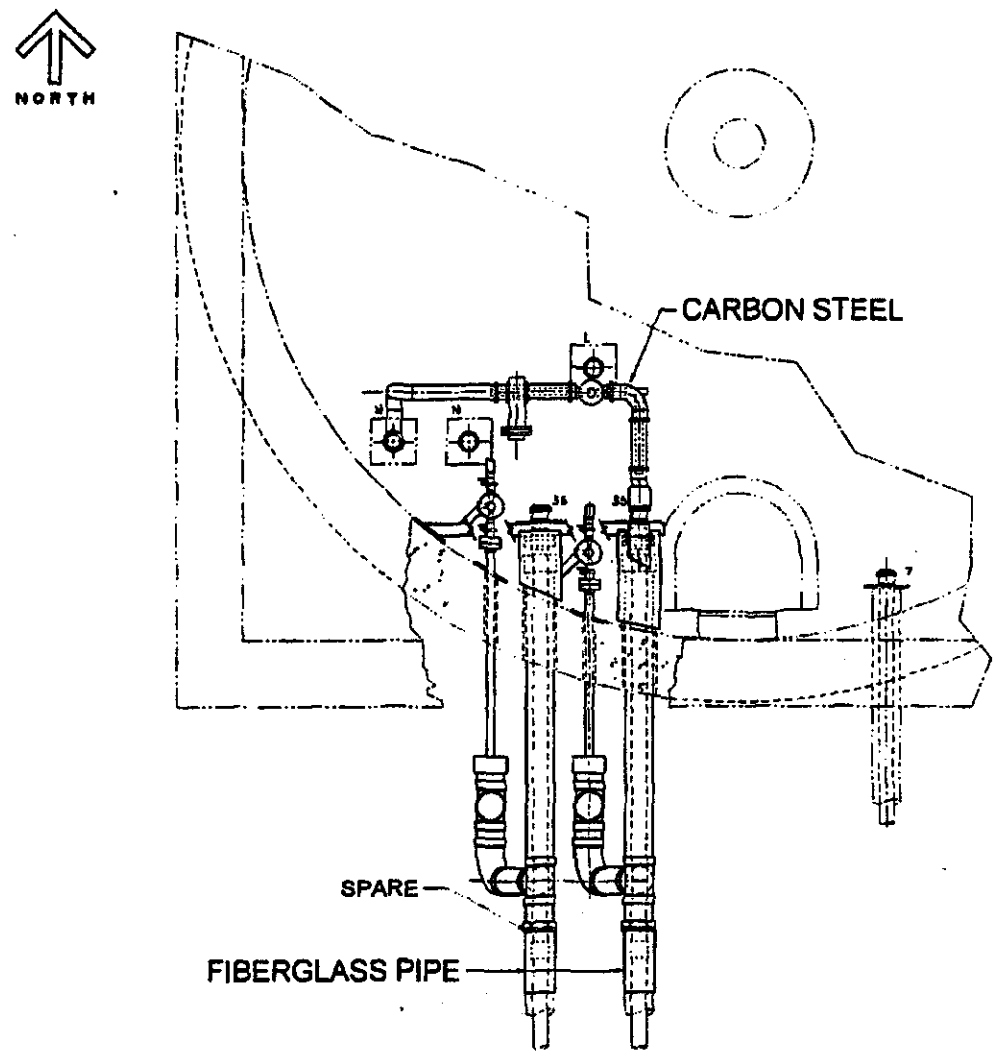


FIGURE 3
Project W-087 Phase I
219-S Piping Plan



* TREATMENT, STORAGE AND/OR DISPOSAL (TSD)

FIGURE 4
Project W-087 Phase I
244-S Piping Plan



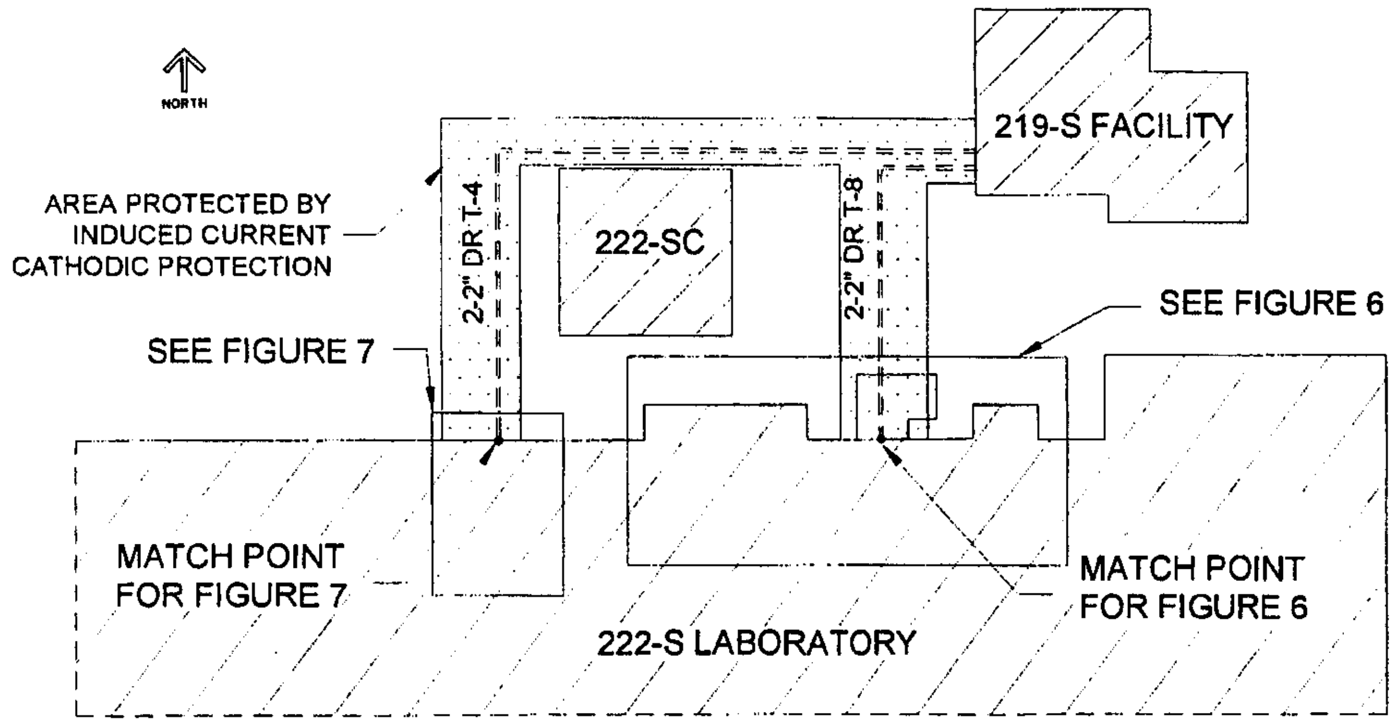


FIGURE 5
Project W-087 Phase II
Site Plan

FIGURE 6
Project W-087 Phase II
Tunnels T-7 and T-8 Piping Plan

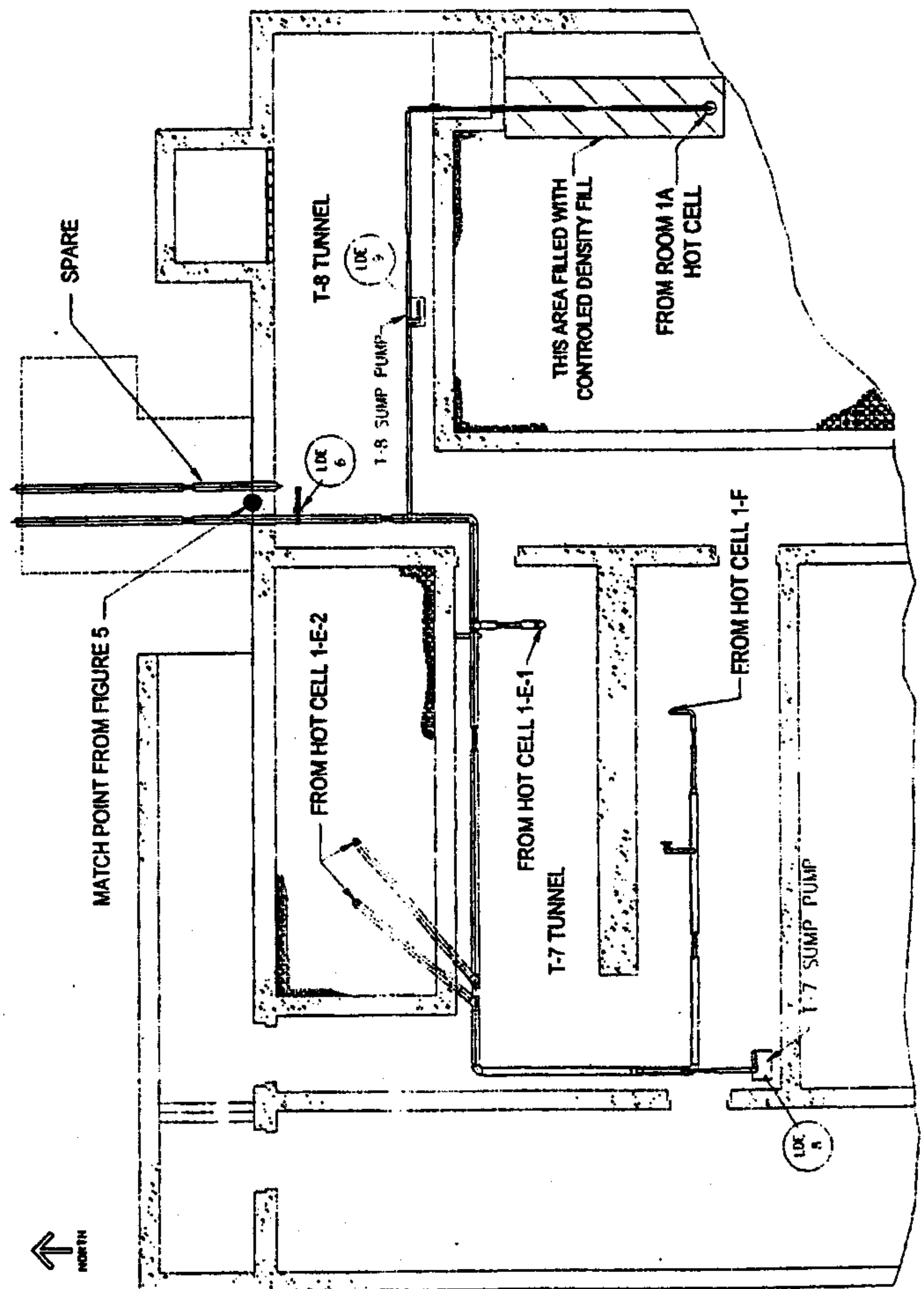
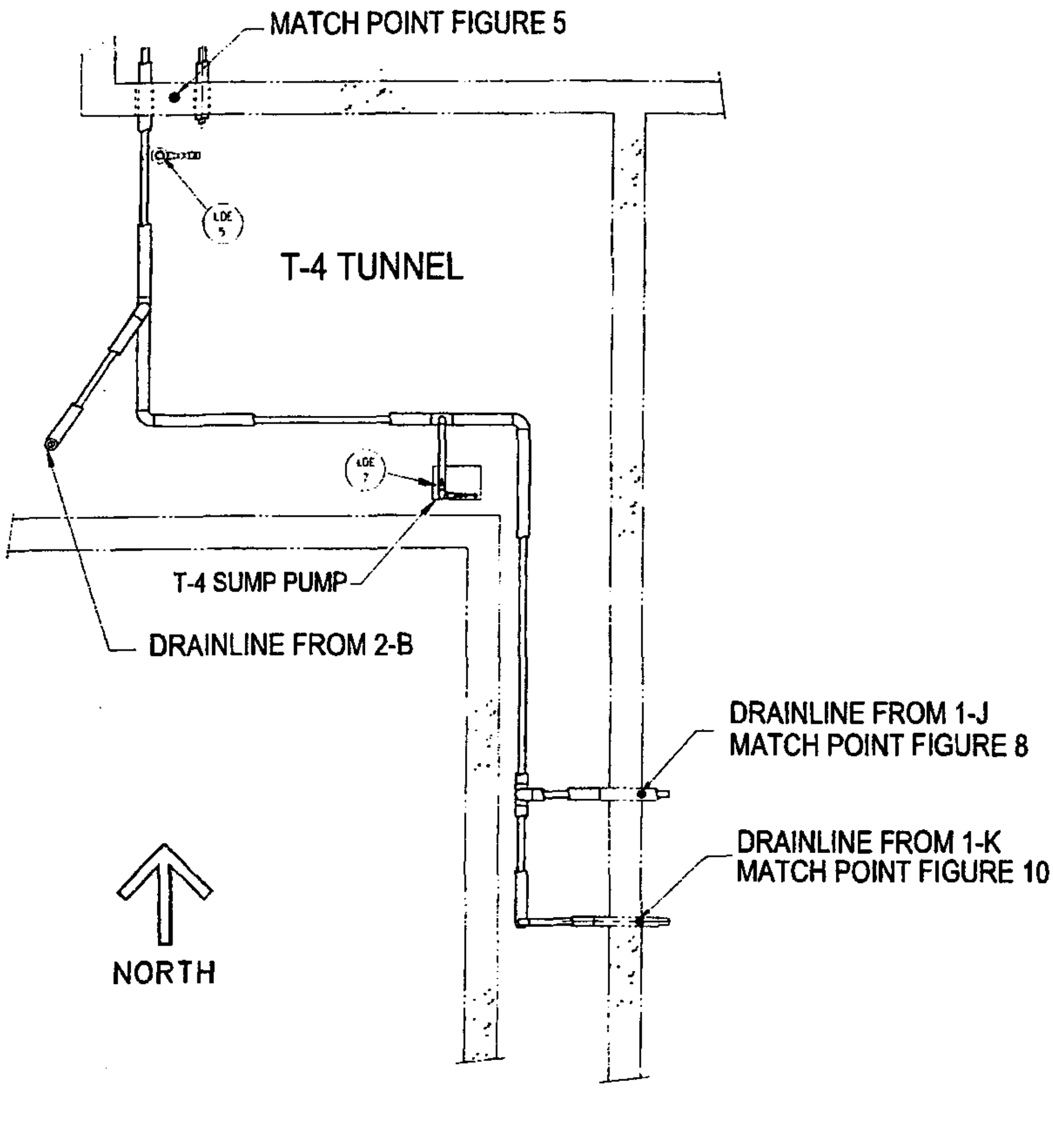


FIGURE 7
Project W-087 Phase II
Tunnel T-4 Piping Plan



2.2 Project W-087 Integrity Assessment Updates and Clarifications

2.2.1 Project W-087 Phase I

2.2.1.1 Updates

After the design and construction IAR's for Phase I were prepared, the waste characteristics were modified to reflect changes from the design basis. This change necessitated a review of the compatibility of the materials within the tank system with the revised waste characteristics. The revised waste characteristics are shown in Table 1. The specification changes were provided to the manufacturer of the fiberglass piping to verify compatibility. The manufacturer has confirmed that the fiberglass is still compatible and the letter documenting the compatibility is included in Attachment 2. The change in waste characteristics does not affect the type 304L stainless steel piping used in 219-S or the ASTM A53 carbon steel piping used in 244-S. Both the Type 304L stainless steel and the ASTM A-53 carbon steel have been used successfully in similar applications. The potential for failure due to internal corrosion is very low.

Table 1
Waste Characteristics and Operational Parameters for the Phase I Transfer Line

Fluid Properties	Density	1.0 – 1.1 g/cc
	Viscosity	0.3 – 3.0 centipoise
	Solids Content	≤ 5.0% by volume
	PH	> 12.0
Radioactive Materials	Total Alpha	≤ 2.71E^{-3} Ci/l
	Total Beta	≤ 1.18 Ci/l
	Strontium-89/90	≤ 2.88E^{-1} Ci/l
	Cesium-137	≤ 4.1E^{-1} Ci/l
	Uranium	≤ 3.0E^{-1} Ci/l
	Plutonium	≤ 2.0E^{-3} Ci/l l
Operational Parameters	Operating Temperature	35°F – 125°F
	Specific Gravity of Fluid: Design	.95 – 1.4

See Reference 3

2.2.1.2 Clarifications

In Appendix A, Page A-3 and Appendix B, Page B-3 the thickness of the fiberglass pipe is incorrectly stated. Both the carrier and encasement pipe are Ameron pipe, Bondstrand 4000 series. The wall thickness of the 3-inch carrier pipe is .120 inches. The wall thickness of the 6-inch encasement pipe is 0.206 inches. This appears to be typographical error since all of the information sent to the independent, qualified, registered professional engineer (IQRPE) had the correct thickness.

2.2.2 Project W-087 Phase II

2.2.2.1 Updates

The waste characteristics for this portion of the system were clarified. The waste characteristics for W-087 Phase I are different from the W-087 Phase II waste characteristics. The clarification in the Phase II waste stream acknowledges that over the effective life of the system, it is not possible to predict the complete makeup of the waste streams generated in the laboratory that will be placed into the tank system. The waste streams generated in the performance of the 222-S Laboratory are very complex and variable. In the absence of a fully characterized waste stream, the 222-S Laboratory has applied administrative controls to ensure that incompatible wastes are not introduced into the tank system.

The administrative controls examined two aspects of compatibility; chemical compatibility and system compatibility. Chemical compatibility addresses the potential for chemicals from different waste streams to react within the system and cause an explosion (a release of toxic fumes, etc). System compatibility addresses the potential for a waste stream to corrode or degrade a tank system component.

Several procedures are integral to the control of both chemical and system compatibility. In summary, many 222-S Laboratory procedures allow laboratory personnel to place liquids into the tank system. However, each of those procedures requires the Shift Operations Manager's (SOM) approval before any liquids are placed into drains. Before the approval is given to add liquids to the system, a procedure requires the SOM to verify that there is space in the tank system, and that the liquid is compatible with the tank system (Reference 5). A compatibility assessment was developed as the technical basis for determining if a waste is prohibited (i.e. if a waste might corrode or degrade an exposed tank system component). The assessment contains a table that lists each of the tank system components, and the chemicals/concentrations/conditions that harm the components. If the SOM determines that the waste/chemicals/concentrations/conditions are incompatible with a component of the tank system, the SOM will not grant approval for disposal to the 219-S Facility tank system.

All components in the tank system are constructed of materials that are compatible with the waste given the procedural controls described above.

2.2.2.2 Clarifications

While included in the assessment effort, an underground portion of the piping from the 1A Hot Cell to the T8 tunnel was not clearly documented in the assessment report (Appendix C). This underground line is embedded in control density fill (CDF), a very low strength concrete (Figure 6). Using CDF keeps the piping away from the soil and eliminates the need for external corrosion protection.

The Engineers stamp in Appendix C (page C-11) was reapplied due to an omission of the date that the first stamp was provided. Other typographical errors were manually corrected by the IQRPE when the second stamp was applied.

The W-087 design assessment (Appendix C) addresses the electronic alarm system used for leak detection and indicates that there is an alarm panel located in the 219-S Facility. This is correct, however, an additional leak detection alarm for the transfer system from 222-S to 219-S is located on a panel in Room 3B of the 222-S laboratory. When a leak is detected an alarm is initiated in both places. Since 219-S is unmanned, 222-S Laboratory personnel alerted by the alarm in Room 3B are dispatched to investigate the problem. Clearing of the alarm can only be done at the panel in 219-S.

2.3 Compliance Strategies

During the execution of Project W-087, numerous discussions were held with the Washington State Department of Ecology to reach agreements on applying the WAC 173-303-640 requirements to the modified facility. These agreements are documented in Reference 6 and Reference 7. The following is a summary of the agreements.

2.3.1 Drain Line Leak Detection

The leak detection system configuration (leak detector quantity and location) provided in the 222-S Laboratory Liquid Waste Disposal System was determined to be adequate and satisfies the requirements of WAC 173-303-640 (4)(c). This system has leak detectors installed within the 222-S Laboratory and at the 219-S Facility.

2.3.2 Room 1-J Drain Line Floor Penetration

Existing piping in Room 1J of the 222-S Laboratory from the Inductively Coupled Plasma Emission Spectrometers to the 219-S Facility Tank System was determined to be adequate for the requirements of WAC 173-303-640 (4)(c). This piping has four 2 ½ -inch long sections of vertical single wall piping within the concrete floor (Figure 8).

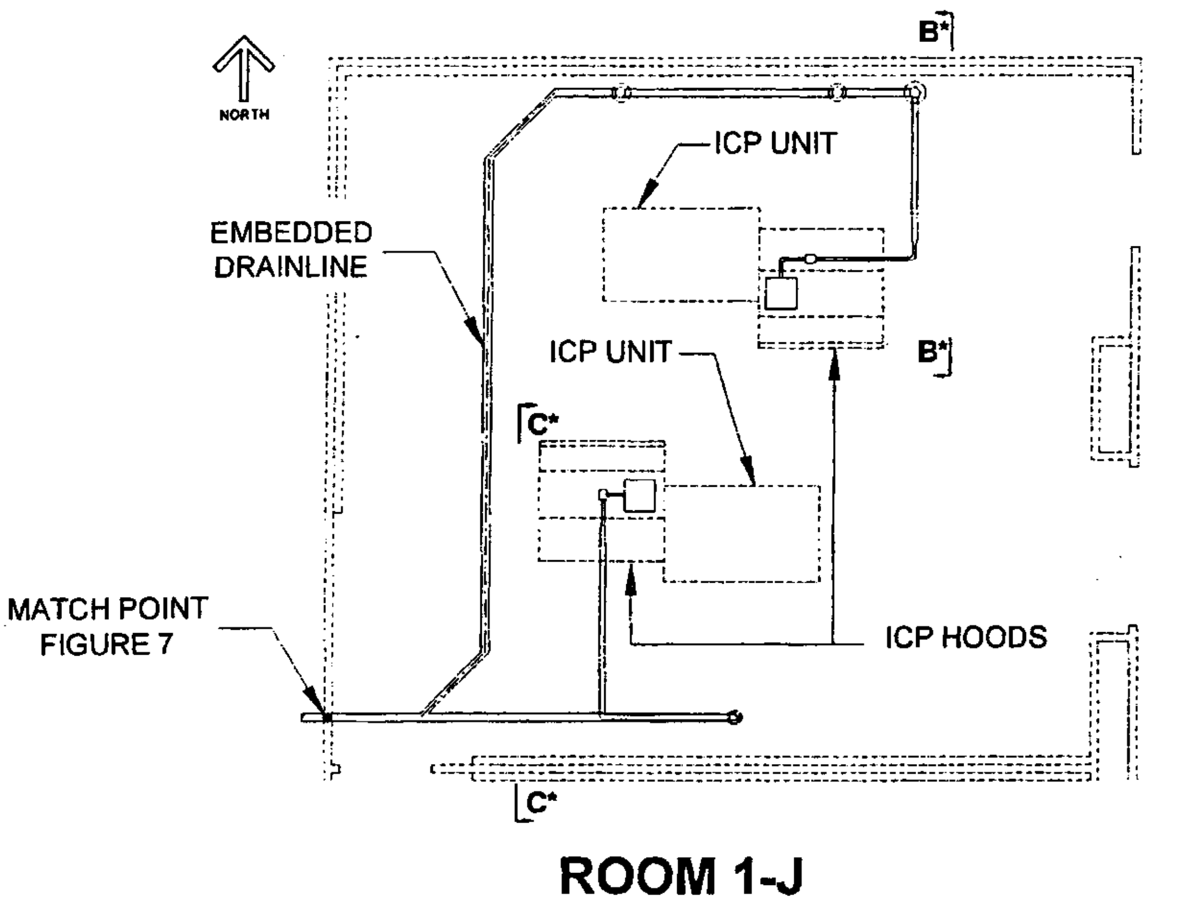
2.3.3 Flush Port Feature on T8 Drain Line

Secondary containment for drain piping in the 222-S Laboratory T8 Tunnel, as configured, was determined to be adequate for the requirements of WAC 173-303-640 (4)(c). The drain piping is equipped with a flush port located on a branch line upstream of the normal flow in the drain line. The flush port provides a beneficial service should a situation arise that requires removal of high dose rate residual solids that could settle in the drain piping. The single-wall flush port is isolated from the drain line by an isolation valve and is normally empty. Figure 9 shows the configuration of the flush port.

3.0 INTEGRITY ASSESSMENT FOR ROOM UPGRADES AND 1-E-2 HOT CELL

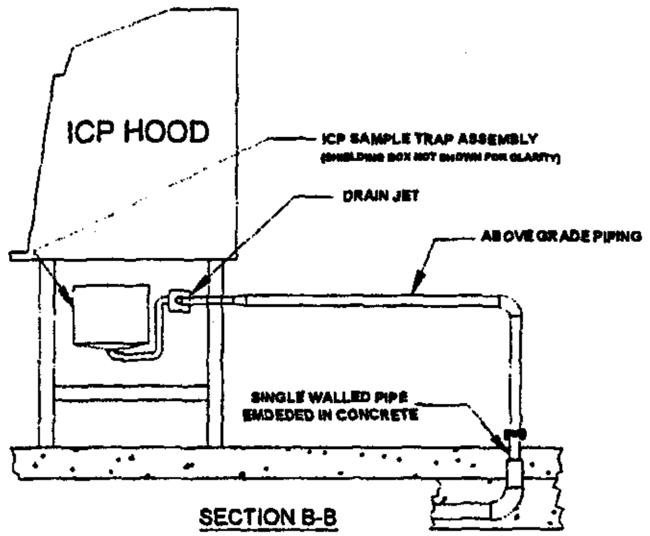
The assessment of the existing ancillary piping in rooms 1J, 1K, and 1-E-2 Hot Cell will provide a system description, address the structural integrity, the compatibility of the waste to be transferred with the piping material, and provide recommendations for future assessments.

FIGURE 8
Piping Plan, Room 1-J

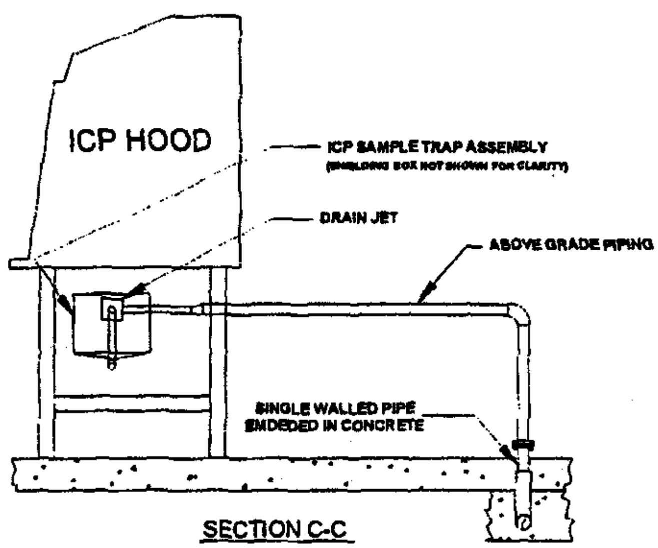


*SEE FIGURE 8a FOR SECTIONS

FIGURE 8a
Sections B-B and C-C, Room 1J



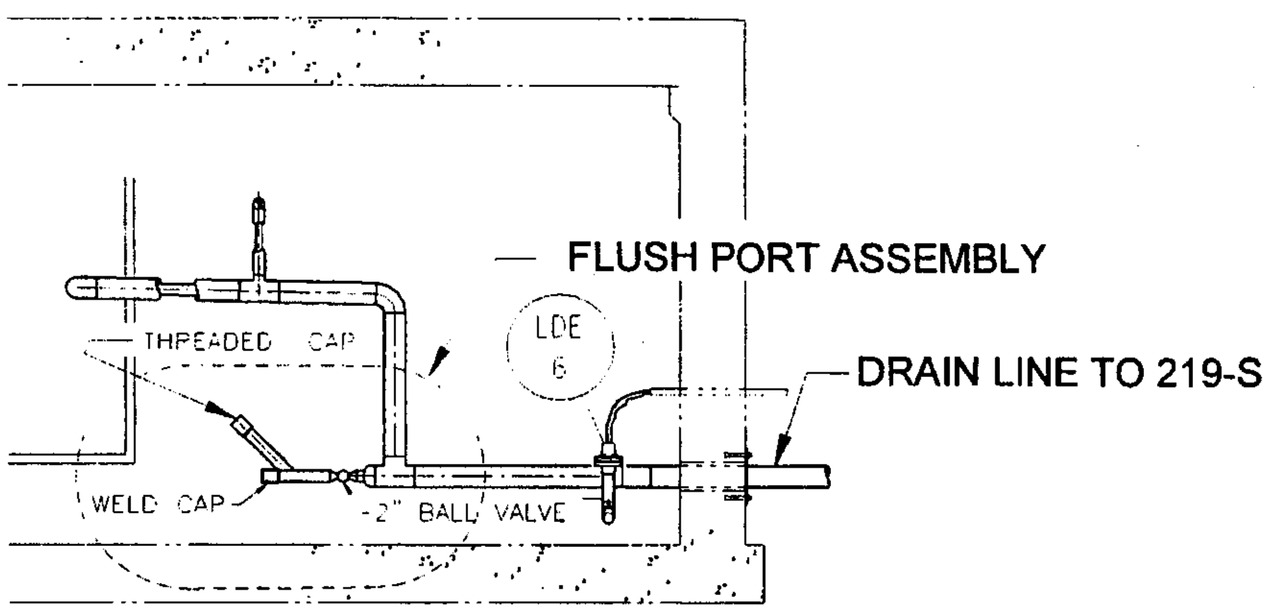
SECTION B-B



SECTION C-C

SEE FIGURE 8 FOR PLAN VIEW

FIGURE 9
Project W-087 Phase II
Flush Port in Tunnel T-8



ELEVATION T-8 TUNNEL LOOKING WEST

3.1 System Descriptions

3.1.1 Room 1J

Room 1J was modified in 1980 to accommodate the Inductively Coupled Plasma Emission Spectrometers (ICP's). The modification included a drain line consisting of a 2-inch stainless steel primary pipe with a 3-inch stainless steel encasement pipe. The drainpipe was installed under the concrete floor and is embedded in concrete. The drain piping is 48 feet long extending into the T4 Tunnel where the primary pipe was connected to the existing piping header and the encasement pipe was capped. In room 1J the primary pipe was extended above the floor in four locations and initially capped with blind flanges. Two of the four pipes are connected to the ICP units by an above ground, single wall, stainless steel pipe.

In 1997 the primary and encasement pipe were connected to the new collection system in the T4 tunnel installed as a part of W-087 Phase II. This connection also provided leak detection. Figure 8 shows the layout of the drainpipe system in room 1J.

3.1.2 Room 1K

Room 1K was modified in 1995 to allow the installation of an Atomic Absorption Spectrometer (AAS) Scrubber. The modification to room 1K included the installation of a new encased drain. The new drain line is a 1½ -inch stainless steel primary pipe with a 3-inch stainless steel encasement. The drain piping is 8 feet long and extends into the T4 Tunnel of 222-S, where the primary pipe was connected the existing piping header and the encasement was capped. In room 1K, the primary pipe was extended above the floor capped with a blind flange. The drainpipe is installed under the floor in Room 1K and is surrounded with soil. The AAS was never installed and the drain has never been used.

In 1997, the primary and encasement pipe were connected to the new collection drain line in the T4 tunnel installed as a part of W-087 Phase II. Figure 10 shows a layout for the room 1K portion of the collection system.

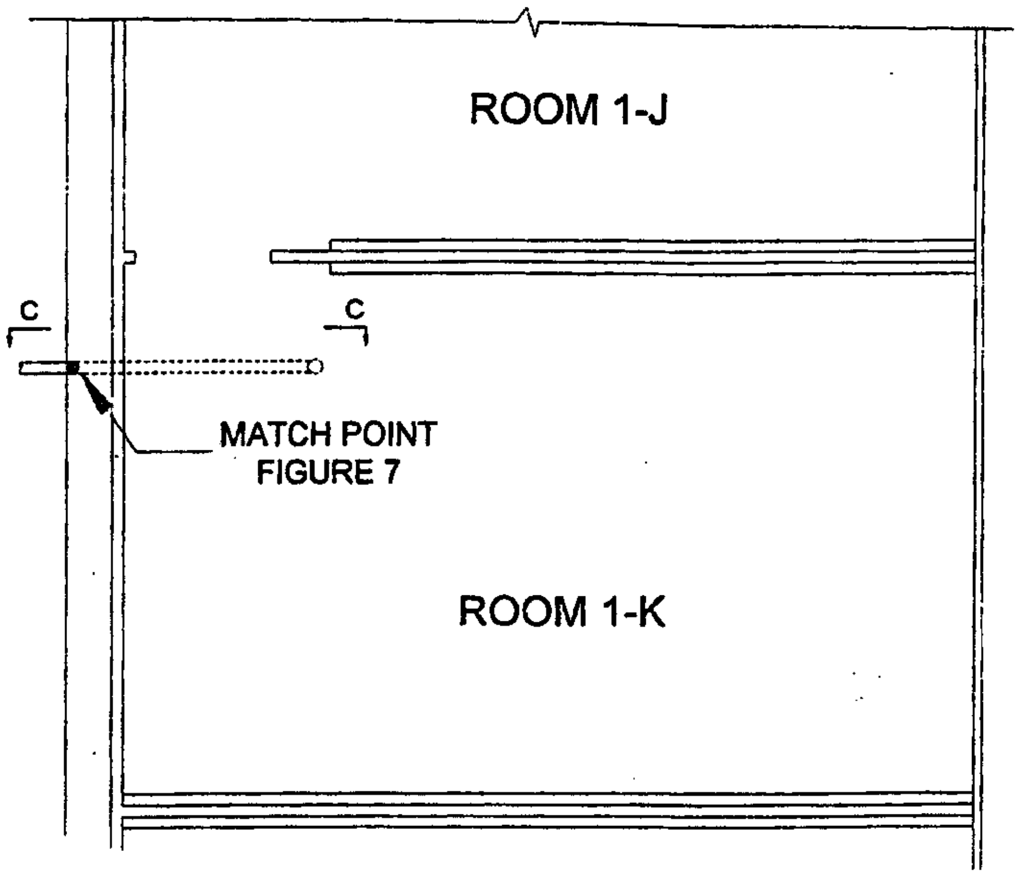
The piping in Room IK was not assessed to the WAC standards. This line has never been used and is tagged as out of service and will remain out of service until documentation demonstrating compliance with WAC 173-303-640 (3) is completed.

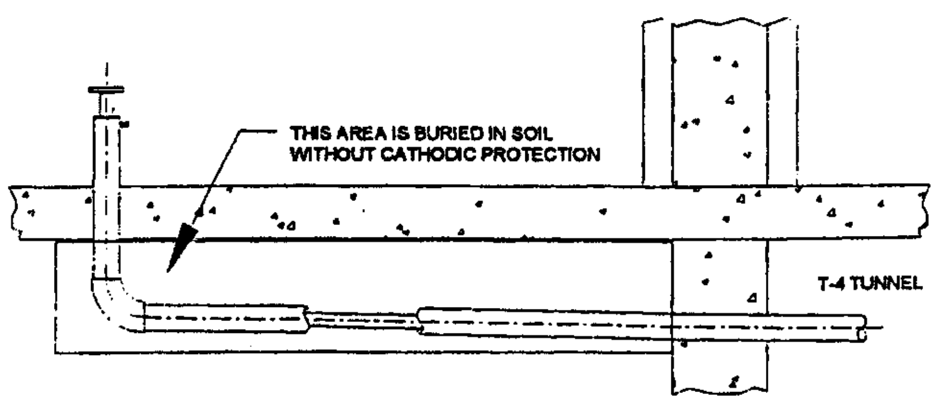
3.1.3 1-E-2 Hot Cell

The 1-E-2 Hot Cell was installed in 1985 as part of the scope of Project W-251, *"Interim High Level Waste Characterization Laboratory"*. The hot cell included the installation of new drain piping and connection to existing piping header. Two drain lines and one slurp line were installed. The drain lines consisted of a 2-inch stainless steel primary pipe with 4-inch schedule steel encasement. The slurp line was a ¾ -inch stainless steel pipe with a 2-inch stainless steel encasement. Each line is approximately 10 feet long and extends into the T7 Tunnel of 222-S. In the T7 Tunnel each of the three primary pipes were connected to the existing piping header and the encasement piping capped. All three lines are embedded in concrete.

In 1997, the slurp line was abandoned in place and capped in the T7 tunnel. The remaining drain lines and encasements were connected to the new collection system piping installed by Project W-087 Phase II. Figure 11 shows a layout for the 1-E-2 Hot Cell portion of the tank system.

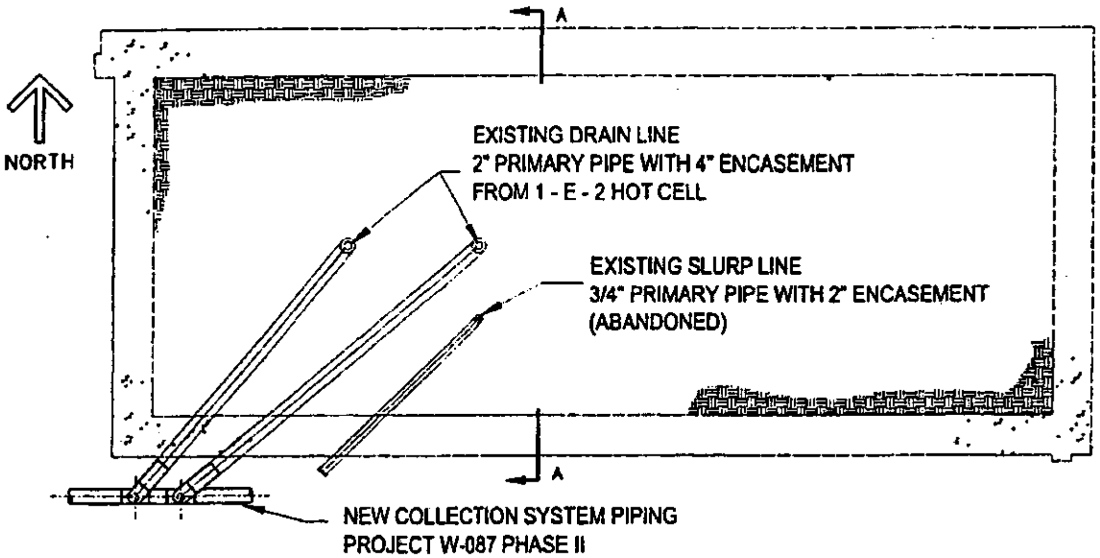
FIGURE 10
Piping Plan and Section, Room 1-K

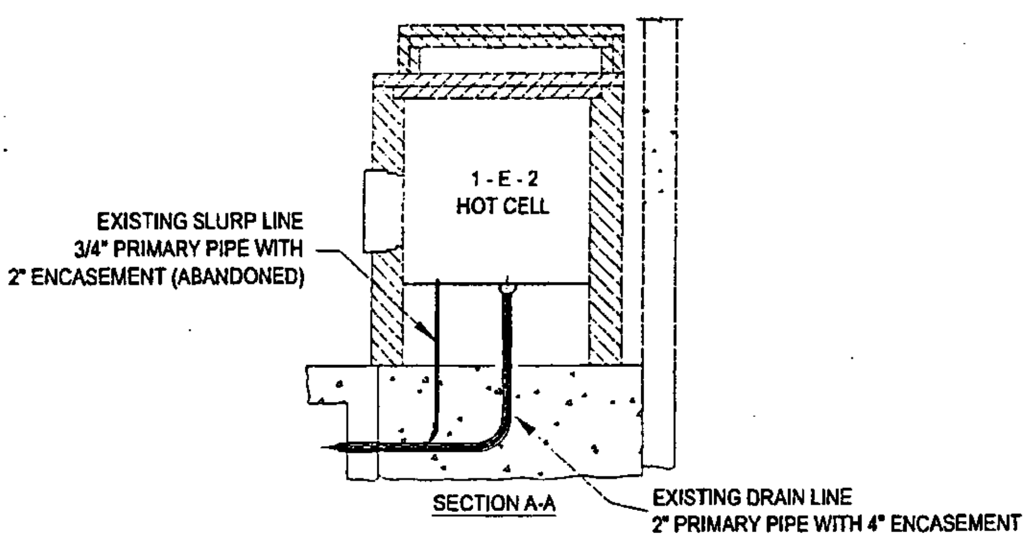




SECTION C-C

FIGURE 11
Piping Plan and Section, 1-E-2 Hot Cell





3.2 Structural Integrity

This section addresses design standards, piping age, and integrity examinations.

3.2.1 Room 1J

The Room 1J piping was constructed to ANSI B31.1 standards and received visual and penetrant testing on the final weld pass when the pipe was install in 1980. In 1998 when the drainpipe was connected to the collection system install by Project W-087 Phase II, the primary and encasement piping were successfully tested. The test was a pneumatic leak test with the pressure of 22 psig. This test demonstrates that the underground portion of the 1J drain line is structurally adequate. Inspection records for the leak testing are included in Process Control Package (PCP) W-087-06 "*Installation of Drain Piping Instrumentation and Electrical Equipment for the 222-S and 219-S Facilities in Support of the W-087 Project*" (Reference 8). The Room 1J piping includes two small portions that are above the floor and connect the ICP unit to the underground drain line. Each of the sections consists of a sample trap and 1-inch and 2-inch stainless steel, schedule 40 pipes. These sections could not be included in the leak test boundary therefore the piping was inspected by Quality Control using ultrasonic methods to determine the wall thickness of the pipes. The results of the examination show a small reduction in wall thickness. The thickness of the 1-inch pipe varied between 0.121 inches and 0.131 inches (Attachment 3). The nominal wall thickness of 1-inch schedule 40 pipe is 0.133 inches. The reduction to 0.121 inches is approximately 10% and does not adversely affect the structural integrity of the system. The wall thickness of the 2-inch pipe varied between 0.137 inches and 0.155 inches (Attachment 3). The nominal wall thickness of schedule 40 pipe is 0.154 inches. The reduction to 0.137 inches is approximately 10% and does not adversely affect the structural integrity of the system. This pipe is above ground and receives frequent inspections to check for leaks. The sample traps (see figure 8a) are encased in lead for dose reduction and cannot be inspected. If these traps were to leak, the leak would be found during the daily inspection.

3.2.2 Room 1K

See Section 3.5.

3.2.3 1-E-2 Hot Cell

The piping in 1-E-2 Hot Cell was constructed to ANSI B31.1 standards and received visual examinations of the fit-up, root, and cover. Penetrant testing was performed on the final weld pass. In 1998 when the drainpipes were connected to the collection system install by Project W-087 Phase II, the primary and encasement piping were successfully tested. The test was a pneumatic leak test with the pressure of 22 psig. This test demonstrates that the piping installed in 1-E-2 is structurally adequate. Inspection records for the leak testing are included in Process Control Package (PCP) W-087-06 "*Installation of Drain Piping Instrumentation and Electrical Equipment for the 222-S and 219-S Facilities in Support of the W-087 Project*" (Reference 8).

3.3 Waste Characteristics

Waste characteristics are the same as Project W-087 Phase II. Both of the room upgrades and the 1-E-2 Hot Cell used stainless steel for the piping material. Stainless steel is compatible with the waste provide precautions are taken. Refer to Section 2.2.2.1 for the detailed discussion.

3.4 Corrosion Protection

The room 1J and 1-E-2 Hot Cell encasement piping is embedded in concrete. Corrosion protection measures are not required for this piping, as none of the piping comes in contact with the soil. Until the assessment is completed, the 1K piping has been prohibited from use (see Section 3.5).

3.5 Disposition of Unfit-for-Use Tank Systems

The piping coming from room 1K is unfit for use until assessments to WAC Standards are performed. Currently, the piping is tagged out of service.

3.6 Schedule For Future Assessments

Future assessments for the 1J and 1-E-2 piping should be scheduled the same as the rest of the 222-S Analytical Laboratory Radioactive Liquid Waste Disposal System.

4.0 STRUCTURAL INTEGRITY ASSESSMENT STATEMENT

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

5.0 REFERENCES

1. **WAC 173-303**, Section 640, *"Tank Systems"*, January 1998

2. **HNF-4849, Rev. 0,** August 1999
   "222-S Environmental Hot Cell Expansion Integrity Assessment Report"

3. **HNF-4589, Rev. 0,** June 1999
   "Integrity Assessment Report of Tanks TK-101 and TK-102"

4. **HNF-4590, Rev. 0,** June 1999
   "Integrity Assessment Report for Project W-178"

5. **HNF-4704, Rev 0,** June 1999
   "219-S Chemical Compatibility"

6. Letter, 99-EAP-446, J.E. Rasmussen (RL) to R. J. Julian (Eco), "Projects W-087, "222-S Radioactive Liquid Waste Line Replacement", and W-178 "219-S Secondary Containment Upgrade", Documentation of Compliance Strategies", dated August 30, 1999

7. Ecology Correspondence, B. L. Becker-Khaleel (Eco) to J.E. Rasmussen (RL), "Re: Projects W-087, "222-S Radioactive Liquid Waste Line Replacement", and W-178 "219-S Secondary Containment Upgrade", Documentation of Compliance Strategies", dated September 14, 1999

8. **Process Control Package No. W-087-06,** January 2, 1995
   "Installation of Drain Piping, Instrumentation and Electrical Equipment for the 222-S and 219-S Facilities in Support of the W-087 Project"

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APPENDIX A

HNF-4737
Revision 0

RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

PROJECT W-087

INTEGRITY ASSESSMENT REPORT

(Design Only)

Prepared By:

Karl F. Feigner

ICF Kaiser Hanford Company

Richland, Washington

For:

U. S. Department of Energy

Subcontract WHC-380393

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General Comments

This Integrity Assessment report (IAR) is prepared by ICF Kaiser Hanford Co. (ICFKH) for Westinghouse Hanford Company (WHC), operations contractor and the Department of Energy (DOE), the system owner. The IAR is prepared in accordance with WAC-173-303-640.

Presently hazardous waste is transferred from the 219-S Facility to the 244-S Catch Station using an underground concrete encased pipe line. The purpose of the project is to replace the existing pipe line so that waste transfer operations comply with the hazardous waste handling provisions contained in WAC-173-303-640, and 40 CFR 265.193.

1.2 System Description

Components included in the assessment are the two new waste transfer pipe lines that will be installed to connect tank 219-S-102 (located in the 219-S Facility) to the 244-S Catch Station. Each pipeline is approximately 3010 ft in overall length. The piping system will be installed below grade and bermed (when required) to achieve minimum burial depth of 36 inches. One line will be used to transfer waste liquid from tank 219-S-102 to the 244-S Catch Station. A pipe jumper will be installed at the Catch Station to permit transferring waste to tank TK-244-S located inside the vault. The jumper will connect the existing distribution piping inside the vault to the new waste transfer pipeline. The other line will be used as a spare, and will be capped at the 244-S Catch Station.

The underground piping is a double containment design. Electronic leak detection stations are installed approximately 1000 ft apart. The carrier pipe is fabricated from fiberglass reinforced epoxy pipe with 3.5 inch outside diameter and 0.07 inch wall thickness. The encasement pipe is also fiberglass reinforced epoxy pipe with 6.625 inch outside diameter and 0.09 inch wall thickness.

The pipe jumper, located in the 244-S Catch Station, and the piping located in the 219-S Facility is constructed from 3 inch diameter, schedule 40, 304L stainless steel pipe. This piping is a single containment design. Connections between the fiberglass piping and stainless steel piping will be made by the use of bolted full face flanges. The fit-up will be made in accordance with manufacturers recommendations to ensure that gaskets are seated properly, without overstressing the fiberglass flanges.

Leak detection probes are permanently installed in test stations that are constructed from the same material as the transfer piping. These stations extend down from grade to the containment piping using pipe that is similar to the containment pipe to house the leak detection probes. Tie-ins to the containment piping are designed to minimize waste liquid pooling. The leak detection system is designed to detect leaks as small as 1.5 gpm occurring in the carrier piping. Automatic alarms and pump interlocks are included in the design. In the event of a leak alarms will alert operators that a leak is occurring, and the interlocks will shut-down/prevent operation of the waste transfer pump. The encasement piping is sloped to the 244-S Catch Station, which is an underground concrete vault. If a leak should occur, liquid accumilations can be removed from the containemnt piping by opening a three-way valve that will route liquid to tank 244-S.

1.3 Scope

This IAR is based on a design assessment performed in accordance with WAC-173-303-640(3)(a) for the piping described in paragraph 1.2 above. Two Chapter 173-303 WAC requirements are not addressed in this report. The first is the development of a schedule for system inspections after operations begin. The second is the development of system post closure plans. Both of these items are outside of the design assessment scope, and therefore, should be addressed by the system owner/operator in the "Hazardous Waste Part B Permit" application submitted to the Washington Department of Ecology (WDOE).

Replacement of the existing pipeline that transfers waste from tank 219-S-102 to the 244-S Catch Station is Phase I of a larger project. Phase II includes engineering/construction of drain lines inside the 222-S Laboratory Hot Cells, and routing drain lines from the 222-S tunnel exit to the 222-S Building. Phase II is excluded from the scope of this assessment.

1.4 Comments on Certification

Paragraph 3.0 contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE) in accordance with WAC-173-303-810(13)(a).

2.0 ASSESSMENT

The system described above, paragraph 1.2, is adequately designed to prevent failure caused by corrosion or by structural loads imposed by the system's intended service. System design is consistent with a design that is typical for a 30 year life. Refer to reference [1] listed in Appendix I for a complete description of the system's intended service. These results are based on review of the applicable codes, standards, design, and construction documents. Design documents include the Functional Design Criteria ref. [1], calculations (listed in Appendix III), and drawings (listed in Appendix IV). Construction documents include the construction specifications, and procurement specifications listed in Appendix I references [2], and [3]. The following paragraphs 2.1 through 2.9 discuss specific considerations for the design assessment.

WAC-173-640 requires secondary containment for hazardous waste treating and handling facilities. Presently the 219-S Facility vault is not lined, however, future plans (Project W-178) include the lining of the 219-S Facility vault with stainless steel. The 244 vault is lined with carbon steel. Videos showing the internal condition of the 244-S Pump Pit indicate that this concrete structure is coated with an epoxy type material. In the unlikely event of a leak developing in the piping contained within the pit, the coating will reduce the possibility of liquid waste migrating from the pit to the surrounding soil. Therefore the concrete vaults and pits associated with this project appear to satisfy the secondary containment requirements of WAC-173-303-640.

2.1 Codes and Standards used as a basis for design are as follows:

American Concrete Institute (ACI)

"ACI Detailing Manual", ACI SP-66, 1988.

"Tolerances for Concrete Construction and Materials", ACI 117, 1990.

"Structural Concrete for Buildings", ACI 301, 1991.

"Hot Weather Concreting", ACI 305R, 1991.

"Cold Weather Concreting", ACI 306.1, 1990.

"Building Code Requirements for Reinforced Concrete", ACI 318-89, 1992.

American Society of Mechanical Engineers (ASME)

"Flanges and Flanged Fittings", ASME B16.5, 1988.

"Factory-made Wrought Steel Buttwelding Fittings", ASME B16.9, 1993.

"Forged Steel Fittings, Socket-welding and Threads", ASME B16.11, 1991.

"Power Piping", ASME B31.3, 1992.

"Chemical Plant and Petroleum Refinery Piping", ASME B31.3, 1993.

"Boiler and Pressure Vessel Code; Section V, Nondestructive Examination", ASME, 1992.

"Boiler and Pressure Vessel Code; Section IX, Qualification Standards for Welding and Brazing Procedures, Welder, Brazers, and Welding and Brazing Operators", ASME, 1992.

American Society for Testing and Materials (ASTM)

"Structural Steel", ASTM A36, 1991.

"Pipe, Steel, Black and Hot Dipped, Zinc-coated Welded and Seamless", ASTM A53, 1990.

"Seamless Carbon Steel Pipe for High-temperature Service", ASTM A106, 1991.

"Steel Bars, Carbon, Cold Finished, Standard Quality", ASTM A108, 1990.

"Seamless and Welded Austenitic Stainless Steel Pipes", ASTM, A132, 1992.

"Forged or Rolled Alloy-steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-temperature Service", ASTM A182, 1992.

"Alloy-steel and Stainless Steel Bolting Material for High-temperature Service", ASTM A193, 1992.

"Carbon and Alloy Steel Nuts for Bolts for High-pressure and High-temperature Service", ASTM A194, 1992.

"Cupola Malleable Iron", ASTM A197-87, 1992.

"Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures", ASTM A234, 1992.

"Heat-resisting Chromium and Chromium-nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels", ASTM A240, 1992.

Seamless and Welded Austenitic Stainless Steel Tubing for General Service", ASTM A269, 1992.

Stainless and Heat-resisting Steel Bars and Shapes", ASTM A276, 1992.

"Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength", ASTM A307, 1992.

Seamless and Welded Austenitic Stainless Steel Pipes", ASTM A312, 1992.

"Castings, Austenitic, Austenitic-ferritic (Duplex), for Pressure Containing Parts", ASTM A351, 1991.

"Wrought Austenitic Stainless Steel Piping Fittings", ASTM A403, 1991.

"Stainless Heat-resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels", ASTM A479, 1992.

"Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes', ASTM A500, 1990.

"Carbon and Alloy Steel Nuts", ASTM A563, 1992.

"Deformed and Plain Billet-steel Bars for Concrete Reinforcement", ASTM A615, 1992.

"Standard Terminology Relating to Soil, Rock and Contained Fluids, ASTM D653, 1990.

"Steel Wire, Carbon, for General Use", ASTM A853, 1991.

"Concrete Aggregates", ASTM C33, 1992.

"Ready Mixed Concrete", ASTM C94, 1994.

"Portland Cement", ASTM C150, 1992.

"Air-entraining Admixtures for Concrete", ASTM C260, 1986.

"Package Dry, Hydraulic-cement Grout (Nonshrink)", ASTM C1107, 1991.

"Specification for Centrifugally Cast Reinforced Thermosetting Resign Pipe", ASTM D2997, 1984.

Miscellaneous

<u>Manual of Steel Construction</u>, 8th Ed., American Institute of Steel Construction (AISC), 1980.

"Recommended Practice", American Society of Nondestructive Testing (ASNT) SNT-TC-1a, 1988.

"Structural Welding Code-steel", American Welding Society (AWS) D1.1, 1992.

"Certification of Welding Inspectors", AWS QC1, 1998.

Manual of Standard Practice, 25th Ed., Concrete Steel Reinforcing Institute (CRSI) MSP-1, 1990.

"Uniform Building Code", International Conference of Building Officials (ICBO), 1991.

"Pipe Hangers and Supports Fabrication and Installation Practices", Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) SP-89, 1991.

"Control of External Corrosion on Underground or Submerged Metallic Piping Systems", National Association of Corrosion Engineers (NACE) RP0169, 1992.

"Control of External Corrosion on Metallic Buried, Partially buried, or submerged Liquid Storage Systems", NACE RP0285, 1985.

2.2 Waste Characterization

Waste is generated by sampling and analysis activities performed in the 222-S laboratory. The aqueous mixed waste contains very low quantities of inorganic salts, metals, and organic materials. It is classified as low-level mixed liquid radioactive waste with intermediate to high activity. The waste characterization, included in Appendix II, was reviewed to evaluate the compatibility of the wastes and materials. Based on the characterization, it is concluded that the wastes and piping materials are compatible. In addition, the wastes will not be susceptible to ignition, or unstable. They do not react violently with water, or form an explosive mixture.

Prior to transferring waste to the 244-S Catch Station for ultimate distribution to underground storage tanks, The waste will be sampled and adjusted to meet Tank Farm acceptance criteria. Concentrations of hydroxide, nitrite, and other waste characteristics will be adjusted. This operation will be performed in a waste collection tank located in the 219-S Facility. The Waste Characterization, included in Appendix II, reflects the adjusted values of the various constituents.

2.3 Potential for Corrosion Failure

Piping materials for the carrier pipe and encasement piping are fiberglass reinforced epoxy resin. This material has been used in similar applications demonstrating its corrosion resistance. The piping manufacturer has stipulated that the piping is suitable for this application. Therefore, it is concluded that the potential for failure caused by internal corrosion is very low. The potential for failure caused by soil-induced corrosion is also very low. Experience with fiberglass piping materials demonstrate that they are particularly resistant to soil-induced corrosion.

Piping installed in the 219-S Facility and the 244-S Catch Station is of single wall construction. Since the piping is already enclosed by a secondary containment system (the exisisting concrete vault), double-pipe construction is not warranted. The piping is schedule 40, 304L stainless steel, which has been used successfully in similar applications. Based on experimental data and past experience with this material, the potential for failure caused by internal corrosion is very low. The piping is not in contact with soil, therefore, soil-induced corrosion will not occur.

2.4 Effects of Vehicular Traffic

Most of the underground piping is located in areas that do not have vehicular traffic passing over the piping. Sections of the piping that will have vehicles crossing over the top are designed to withstand the loading of heavy trucks. This capability is demonstrated by strength calculations performed by the piping manufacutre.

2.5 Foundation Loading

Calculations were performed to determine the suitability of the footings, and pipe supports. These calculations demonstrate that footings and supports are properly designed.

2.6 Effects of Frost Heave

Piping is protected from the potential effects of frost heave. Underground piping is located at depths greater than 36 inches, which is the accepted limit for the frost zone.

2.7 Pressure Effects

Design calculations for both the carrier and containment piping are based on maximum internal pressures of 125 psig and 0 psig respectively. Calculations were performed using a fluid temperature of 90 °F. The design pressure selected for the carrier pipe is two times the shutoff head generated by the waste transfer pump. Elevation head between the 219-S Facility and the 244-S Catch Basin is minimal, approximately 15 ft. According to manufacturer data, this piping is suitable for internal pressures up to 290 psi for both the carrier and containment pipe. The pressure rating is for operating temperatures up to 229 °F.

Calculated maximum sustained stress for the piping system is 78% of yield strength. Maximum sustained stress includes the effects of the weight of the piping, including contents, and maximum pressure. Therefore it is concluded that the piping design is sufficient to withstand the effects of internal pressure.

After the piping is constructed, it will be hydrotested in accordance ASME B31.3.

2.8 Thermal Effects

The piping system was analyzed to determine the effect of heating the pipe from ambient to operating temperature. Resulting maximum stress from this condition is 63% of yield strength. Based on this analysis, the piping system is designed with sufficient flexibility to permit thermal growth resulting from the operating conditions.

2.9 Seismic Effects

The piping is designed in accordance with UBC-1991 to withstand seismic zone 2B events. Resulting maximum stress caused by this condition is 90% of yield strength.

3.0 STRUCTURAL INTEGRITY ASSESSMENT CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

KARL F. FEIGNER
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
July 10, 1995
EXPIRES: MARCH 19, 1996

Appendix I
(References)

References

for

Project W-087

222-S Radioactive Liquid Waste Line Replacement

[1] "Functional Design Criteria Radioactive Liquid Waste Line Replacement. Project W-087". WHC-SD-W087-FDC-001 Rev.3. 10/12/94.

[2] "Construction Specification 222-S Radioactive Liquid Waste Line Replacement". W-087-C1. 10/12/94.

[3] "Construction Specification 222-S Radioactive Liquid Waste Line Replacement". W-087-C1. 10/12/94.

[4] "Acceptance Inspection Plan for Project W-087 222-S Radioactive Liquid Waste Line Replacement. Construction Forces". IP-W-087-C1-1.

[5] Fax Transmittal from Jud Chapin. JSC Inc. to Keith Foote. ICFKH. "Fibercast Pipe". 3/8/94.

[6] Albertson. M. L.. Barton. J. R. . and Simons. D. B.. Fluid Mechanics for Engineers. Prentice-Hall. 1960.

[7] Baumeister. T.. Marks Mechanical Engineers Handbook. Mcgraw-Hill. 1992.

[8] Fibercast. Corrosion Resistant Products Catalog.

[9] Roberson. J.. Cassidy. J.. and Chaudry. M. H.. Hydraulic Engineering. Houghton Mifflin Co.. 1988.

[10] Computer Program "AutoPipe Ver. 4.5. Engineering Design Automation. 1993.

[11] "Standard Arch-Civil Design Criteria". SDC-4.1 Rev.12.

[12] Holtz. R. D. and Kovacs. W. D.. "An Introduction to Geotechnical Engineering". Prentice-Hall Civil Engineering and Engineering Mechanics Series. 1981.

Appendix II
(Waste Characterization)

Waste Characterization

for

Project W-087

222-S Radioactive Liquid Waste Line Replacement

Fluid Properties	Operating Range
Temperature	50°F - 90°F
Density	1.0 - 1.05 g/cc
Viscosity	0.3 - 3.0 centipoise
Solids Content	0.0 - 2.0 vol. %
pH	≤12.14 (0.014 Molar OH^-
Nitrite	≤0.015 Molar
Cl^-	<0.035 Molar
Organic	No Separable Phase
Pu	<0.01 gm/gal

Radioactive Materials	
Total Alpha	5.0E-06 Ci/l
Total Beta	2.0E-04 Ci/l
Strontium-89/90	3.0E-05 Ci/l
Cesium-137	5.0E-05 Ci/l
Uranium	1.0E-02 g/l
Plutonium	4.0E-06 g/l

Appendix III
(Calculations List)

Calculations List

for

Project W-087

222-S Radioactive Liquid Waste Line Replacement

"Radioactive Liquid Waste Line Leak Rate Calculation", ICFKH Calc. No. W-087-P2", 5/25/94.

"Stress Analysis on Buried Fibercast Piping', ICFKH Calc. No. W-087-P01, 5/16/94.

"Flow Calculation for Transfer Line", ICFKH Calc. No. W-087-C01, 1994.

Appendix IV
(Drawing List)

Drawing List

for

Project W-087

222-S Radioactive Liquid Waste Line Replacement

Drawing List Area Map, Drawing No. H-2-820829.

Civil Site Plan, Drawing No. H-2-820830.

Civil Plan & Profile STA 0+00 to STA 14+00, Drawing No. H-2-820831.

Civil Plan & Profile STA 14+00 to STA 24+00, Drawing No. H-2-820832.

Civil Plan & Profile STA 24+00 to STA 29+16.63, Drawing No. H-2-820833.

Civil Miscellaneous Details, Drawing No. H-2-820834.

P & ID Liquid Waste Drain Legend, Sheet 1 of 3, Drawing No. H-2-820836.

P & ID Liquid Waste Drain Collection, Sheet 2 of 3, Drawing No. H-2-820836.

P & ID Liquid Waste Drain Transfer, Sheet 3 of 3, Drawing No. H-2-820836.

Piping Demolition Plan 219-S, Sheet 1 of 7, Drawing No. H-2-820838.

Piping Demolition Sections 219-S, Sheet 2 of 7, Drawing No. H-2-820838.

Piping Plan 219-S, Sheet 3 of 7, Drawing No. H-2-820838.

Piping Section 219-S, Sheet 4 of 7, Drawing No. H-2-820838.

Piping Details 219-S, Sheet 5 of 7, Drawing No. H-2-820838.

Piping Details 219-S, Sheet 6 of 7, Drawing No. H-2-820838.

Piping Miscellaneous Details 219-S, Sheet 7 of 7, Drawing No. H-2-820838.

Piping 244-S Pump Pit Plan, Sections and Details, Sheet 1 of 3, Drawing No. H-2-820839.

Piping 244-S Pump Pit JMPR ARR/COV BLK MOD/PNT Diagram, Sheet 2 of 3, Drawing No. H-2-820839.

Piping 244-S Pump Pit Jumper ASSY 35-M, Sheet 3 of 3, Drawing No. H-2-820839.

Instrumentation Panel 2 Modification, Drawing H-2-820840.

Instrumentation Panel 2 Connection Diagram, Sheet 1 of 2, Drawing H-2-820841.

Instrumentation Panel 2 Connection Diagram, Sheet 2 of 2, Drawing H-2-820841.

Instrumentation Panel A Modification, Drawing H-2-820842.

Instrumentation Panel A Interconnection Diagram, Drawing H-2-820843.

Instrumentation Sections & Details, Drawing H-2-820844.

Electrical Plot Plan, Drawing No. H-2-820846.

Electrical Plans, Drawing No. H-2-820847.

Electrical Leak Detection Elementary Diagram, Drawing No. H-2-820848.

Electrical Sections & Details, Drawing No. H-2-820849.

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RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

PROJECT W-087

INTEGRITY ASSESSMENT REPORT

(Construction of Phase I)

Prepared by:

Karl F. Feigner

Fluor Daniel Northwest, Inc.

Richland, Washington

For:

Rust Federal Services of Hanford Inc.
and
Lockheed Martin Hanford Co.

TABLE OF CONTENTS

INTRODUCTION

1.1 General Comments

This Integrity Assessment Report (IAR) is prepared by Fluor Daniel Northwest, Inc. (FDNW) for Rust Federal Services of Hanford Inc., Lockheed Martin Hanford Co., operations contractors' and the Department of Energy (DOE), the system owner. The IAR is intended to demonstrate that construction was performed in accordance with the provisions of WAC-173-303-640 (3) (c) through WAC-173-303-640 (3) (h).

1.2 System Description

The waste system components included in the assessment are the two new waste transfer pipe lines that are installed to connect tank 219-S-102 (located in the 219-S Facility) to the 244-S Catch Station. Each pipeline is approximately 3010 feet in overall length. The piping system is installed below grade and bermed (when required) to achieve minimum burial depth of 36 inches. One line is used to transfer waste liquid from tank 219-S-102 to the 244-S Catch Station. A pipe jumper is installed at the Catch Station to permit transferring waste to tank TK-244-S located inside the vault. The jumper will connect the existing distribution piping inside the vault to the new waste transfer pipeline. The other line will be used as a spare, and will be capped at the 244-S Catch Station, and 219-S.

The underground piping is a double containment design. With electronic leak detection stations installed approximately 1000 feet apart. The carrier pipe is fabricated from fiberglass reinforced epoxy pipe with 3.5 inches outside diameter and 0.07 inch wall thickness. The encasement pipe is also fiberglass reinforced epoxy pipe with 6.625 inches outside diameter and 0.09 inch wall thickness.

The pipe jumper, located in the 244-S Catch Station, and the carrier piping located in 219-S Facility is constructed from 3 inch diameter, schedule 40, 304L stainless steel pipe. New piping in 219-S Facility, that is installed above tank TK-104 is single containment design, and the rest of the line installed above tank TK 103 has a 6 inch, schedule 40, Type 304L stainless steel encasement installed over the 3 inch carrier. Connections between the fiberglass piping and stainless steel piping are made by the use of bolted full face flanges.

Leak detection probes are permanently installed in test stations that are constructed from the same material as the transfer piping. These stations extend down from grade to the containment piping using pipe that is similar to the containment piping and are designed to minimize waste liquid pooling. The leak detection system is designed to detect leaks as small 1.5 gpm occurring in the carrier piping. Automatic alarms and pump interlocks are included in the design. In the event of leaks an alarm will alert operators that a leak is occurring, and the interlocks will shutdown/prevent operation of a waste transfer pump. The encasement piping is sloped to the 244-S Catch Station. If a leak should occur, liquid accumulation can be removed from the containment piping by opening a three-way valve that will route liquid to tank 244-S.

1.3 Scope

This report applies to the facilities described above in paragraph 1.2. It is based on periodic inspection performed on a scheduled basis by qualified persons. Inspections were performed on the system described using applicable codes, standards, and properly maintained tools.

1.4 Comments on Certification

Paragraph 3.0 contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE) in accordance with WAC-173-303-810(13)(a).

2.0 ASSESSMENT

The system described above, paragraph 1.2, is properly installed in accordance with the drawing, specifications, and applicable codes. This assessment is based upon inspection performed by qualified personnel during the construction phase of the project. Discussion of specific considerations follow.

2.1 Weld Breaks

Personnel that joined sections of piping together were pre-qualified before performing the work. In process inspection was employed in accordance with ASME B31.3 to determine the quality of the joints. The inspection process was supervised by an AWS QC1 certified Weld Inspector, supplied by the contractors. In addition, a hydro test performed in accordance with the applicable piping code, demonstrated that the piping was properly jointed. Hydrostatic pressure tests were performed after each section of pipe was completed, but prior to burial (for underground piping) so that leaks could be visually detected.

2.2 Punctures

The piping hydrostatic pressure tests indicates that none exist.

2.3 Scrapes of Protective Coating

Inspections performed during construction indicate that the outer epoxy coating was not damaged. Sand bedding, or Controlled Density Fill (CDF) was used during the backfill process.

2.4 Cracks

Based on the inspections and hydrostatic pressure tests performed, cracks are not apparent.

2.6 Other Structural Damage

Based on inspection performed during construction, no structural damage is evident.

2.7 Backfill

Installation of the Fiberglass reinforced epoxy resin piping required excavation and the use of backfill. The design allowed the use of CDF or sandbedding for one foot around the piping system. CDF was used on the majority of all backfill, and sandbedding on the rest. Soil compaction tests were performed on the sandbedding, and the subgrade. Placement methods were based on the applicable codes.

2.8 Tightness Test

Hydrostatic tests were performed on the inner carrier piping as each section was completed. Pneumatic tests, were performed on the encasement piping prior to backfill. These tests indicate that the system is leak free. Hydrostatic test pressures were based on the ASME B31.3 piping code, and are as follows: inner carrier pipe, 188 psig test pressure, and the encasement pipe was tested at 10 psig. There was a leak in the inner carrier pipe that was discovered during hydrostatic testing. The pipe section was replaced and tested. Test pressures were held for a minimum duration of 10 minutes.

2.9 Support System

Inspections were performed on 100% of the welding, and a minimum of 10% of the expansion anchor installation in accordance with the specification and drawings. Based on these inspections, the support's systems are properly installed.

2.10 Corrosion Protection System

Cathodic protection is not included in the system design, nor is it required. The buried piping is constructed from fiberglass reinforced epoxy materials that are inherently resistant to soil corrosion damage.

3.0 Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who mange the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware false information, including the possibility of fine and imprisonment for knowing violations."

KARL F. FEIGNER
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER
5/15/97
EXPIRES: 3/19/98

RADIOACTIVE LIQUID WASTE LINE

REPLACEMENT

PROJECT W-087 Phase II

INTEGRITY ASSESSMENT REPORT

(Design Only)

Prepared By:

Karl F. Feigner

ICF Kaiser Hanford Company

Richland, Washington

For:

U. S. Department of Energy

Contract WHC-380393

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General Comments

This Integrity Assessment Report (IAR) is prepared by ICF Kaiser Hanford Co. (ICFKH) for Westinghouse Hanford Company (WHC), operations contractor and the Department of Energy (DOE), the system owner. The IAR is prepared in accordance with WAC-173-303-640.

Presently, the sampling, analysis, and decontamination activities being performed in the 222-S Laboratory generate approximately 50,000 gallons of low level mixed aqueous hazardous waste per year. Of the total amount, about 12,000 gallons is flushing water. The waste is collected and transported to the 219-S Facility, for short term storage, where hydroxide and nitrite concentration are adjusted to comply with Tank Farm acceptance criteria. When Tank Farm acceptance criteria is achieved, the waste is transferred to the 244-S Facility where it is distributed to the appropriate storage tank. An existing piping network is employed to accomplish the waste transfers, however, this piping requires replacement to comply with the hazardous waste handling provisions contained in WAC-173-303-640, and 40 CFR 265.193.

Phase I of the project involves replacement of the underground piping used to transport the waste from the 219-S Facility to the 244-S Facility. Phase II of the project involves the replacement of the drain and collection piping located within concrete tunnels below the floor of the ~~22-S~~ 222-S Facility, and the underground piping that transports waste from the 222-S Laboratory to the 219-S Facility.

KAF 5/22/00

1.2 Scope

This IAR is based on a design assessment performed in accordance with WAC-173-303-640(3) (a) for the Phase II piping described in paragraph 1.3 below. Replacement of the existing pipeline that transfers waste from tank 219-S-102 to the 244-S Catch Station is Phase I of the project, and is excluded from the scope of this assessment. The design for Phase I piping was completed before the design effort for Phase II piping began. Therefore, a design integrity assessment has already been performed for Phase I piping. Reported results of the assessment (ICF Transmittal No. JHA-02, dated 7/14/95) indicate that Phase I piping is appropriately designed.

KAF 5/22/00

~~The~~ Two Chapter 173-303 WAC requirements are not addressed in this report. The first is the development of a schedule for system inspections after operations begin. The second is the development of system post closure plans. Both of these items are outside of the design assessment scope, and therefore, should be addressed by the system owner/operator in the "Hazardous Waste Part B Permit" application submitted to the Washington Department of Ecology (WDOE).

1.3 System Description

Phase II components include Tunnel T-8 transport piping, Tunnel T-4 transport piping, Tunnel T-8 collection piping, Tunnel T-4 collection piping, interconnection piping, and equipment drain piping. Descriptions follow:

- **Tunnel T-8 Transport Piping:**

Two new waste transfer pipelines will be installed to connect the collection piping located in Tunnel T-8, inside the 222-S Laboratory to the interconnection piping that ties into Tank 219-S-104 located in the 219-S Facility. The piping begins just inside of the battery limits of the 222-S Facility and ends just inside the battery limits of the 219-S Facility. Each pipeline is approximately 81 ft in overall length, and is sloped from the 222-S Facility to the 219-S Facility. Minimum slope is 1.87% to facilitate free drainage. The piping system will be installed below grade at a minimum burial depth of 36 inches. One line will be used to transfer waste liquid, while the other is used as a spare.

The underground piping is a double containment design, with electronic leak detection devices permanently installed in stations located near the piping terminus to signal potential leaks. These stations extend down from grade to the containment piping-using pipe that is similar to the containment pipe to house the leak detection probes. Tie-ins to the containment piping are designed to minimize waste liquid pooling. Automatic panel board alarms are included. If a leak should occur, liquid accumulations can be removed from the containment piping by opening a valve that will route liquid to Tank 219-S-104. The carrier pipe is fabricated from 2-inch diameter, schedule 40, 304L stainless steel pipe. The encasement pipe is also schedule 40, 304L stainless steel pipe, but its diameter is 4 inches.

- **Tunnel T-4 Transport Piping:**

T-4 KJJ 5/22/00

Two new waste transfer pipelines will be installed to connect the collection piping located in Tunnel ~~T-8,~~ inside the 222-S Laboratory to the interconnection piping that ties into Tank 219-S-104 located in the 219-S Facility. The piping begins just inside of the battery limits of the 222-S Facility and ends just inside the battery limits of the 219-S Facility. Each pipeline is approximately 165 ft in overall length, and is sloped from the 222-S Facility to the 219-S Facility. Minimum slope is 1.87% to facilitate free drainage. The piping system will be installed below grade at a minimum burial depth of 36 inches. One line will be used to transfer waste liquid, while the other is used as a spare.

The underground piping is a double containment design, with electronic leak detection devices permanently installed in stations located near the piping terminus to signal potential leaks. These stations extend down from grade to the containment piping-using pipe that is similar to the containment pipe to house the leak detection probes. Tie-ins to the containment piping are designed to minimize waste liquid pooling. Automatic panel board alarms located in and 219-S Facility is included. If a leak should occur, liquid accumulations can be removed from the containment piping by opening a valve that will route liquid to Tank 219-S-104. The carrier pipe is fabricated from 2 inch diameter, schedule

40, 304L stainless steel pipe. The encasement pipe is also schedule 40, 304L stainless steel pipe, but its diameter is 4 inches.

- **Tunnel T-8 Collection Piping**

Drains from Hot Cells 1A, 1E-1, 1E-2, and 1F are routed to the tunnel collection piping. The drains are located in Rooms 1-A, 1-E, and 1-F respectively. Also included are the pump discharge lines of the T-7 Sump Pump located in T-7 Tunnel, and the T-8 Sump Pump located in T-8 Tunnel. All piping is double encased, with 304L stainless steel schedule 40 pipe used for both the carrier pipe and encasement pipe. Carrier piping is either 1-inch diameter, or 2-inch diameter, depending upon the drain application. Encasement sizes are 2-inch diameter for the 1-inch carrier pipe, or 4-inch diameter for the 2-inch carrier pipe.

Leak detection instrumentation is included in the design. Instruments are installed at the terminus of the collection piping at the point where the collection piping joins the transport piping. In the event of a leak, remote panel board alarms will be activated. These alarms are located in the 219-S Facility.

- **Tunnel T-4 Collection Piping:**

Various drains in rooms 1-K, 1-J, and 2-B will be routed to the tunnel collection piping. The following drains are included: the Atomic Absorption Spec Scrubber located in room 1-K; ICP drains leaving room 1-J, and both Hood 16A and Hood 16B located in room 2-B. Included in the new piping is the discharge lines from T-4 Sump Pump located in T-4 Tunnel. All piping is double encased, with 304L stainless steel schedule 40 pipe used for both the carrier pipe and encasement pipe. Carrier piping is either 1-inch diameter or 2-inch diameter, depending upon the drain application. Encasement sizes are 2-inch diameter for the 1-inch carrier pipe, or 4-inch diameter for the 2-inch carrier pipe.

Leak detection instrumentation is included in the design. Instruments are installed at the terminus of the collection piping at the point where the collection piping joins the transport piping. In the event of a leak, remote panel board alarms will be activated. These alarms are located in the 219-S Facility.

1.4 Comments on Certification

Paragraph 3.0 contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE) in accordance with WAC-173-303-810(13)(a).

2.0 ASSESSMENT

The system described above, paragraph 1.3, is adequately designed to prevent failure caused by corrosion or by structural loads imposed by the system's intended service. System design is consistent with a design that is typical for a 30-year life. Refer to reference [1] listed in Appendix I for a complete description of the system's intended service. These results are based on review of the applicable codes, standards, design, and construction documents. Design documents include the Functional Design Criteria ref. [1] calculations (listed in Appendix III), and drawings (listed in Appendix IV). Construction documents include the construction specifications, and procurement specifications listed in Appendix I references [2] , [3], [4], [5], [6] and [7] . The following paragraphs 2.1 through 2.9 discuss specific considerations for the design assessment.

WAC-173-640 requires secondary containment for hazardous waste treating and handling facilities. Presently the 219-S Facility vault is not lined; however, future plans (Project W-178) include the lining of the 219-S Facility vault with stainless steel. Therefore the concrete vault associated with this project appears to satisfy the secondary containment requirements of WAC-173-303-640.

2.1 Codes and standards used as a basis for design are as follows:

American Concrete Institute (ACI)

"ACI Detailing Manual ", ACI SP-66, 1988.

"Tolerances for Concrete Construction and Materials", ACI 117, 1990.

"Structural Concrete for Buildings", ACI 301, 1991.

"Hot Weather Concreting", ACI 305R, 1991.

"Cold Weather Concreting", ACI 306.1, 1990.

"Building Code Requirements for Reinforced Concrete", ACI 318-89, 1992.

American National Standard Institute (ANSI)

"Zinc Coated Ferrous Ground Rods for Overhead or Underground Line Construction", ANSI C135.30.

American Society of Mechanical Engineers (ASME)

"Flanges and Flanged Fittings", ASME B16.5, 1988.

"Factory-made Wrought Steel Buttwelding Fittings", ASME B16.9, 1993.

"Forged Steel Fittings, Socket-welding and Threads", ASME B16.11, 1991.

"Chemical Plant and Petroleum Refinery Piping", ASME B31.3, 1993.

American Society for Testing and Materials (ASTM)

"Structural Steel", ASTM A36, 1991.

"Steel Bars, Carbon, Cold Finished, Standard Quality", ASTM A108, 1990.

"Seamless and Welded Austenitic Stainless Steel Pipes", ASTM A132, 1992.

"Forged or Rolled Alloy-steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-temperature Service", ASTM A182, 1992.

"Alloy-steel and Stainless Steel Bolting Material for High-temperature Service", ASTM A193, 1993.

"Carbon and Alloy Steel Nuts for Bolts for High-pressure and High-temperature Service", ASTM A194, 1993.

"Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures", ASTM A234, 1992.

"Seamless and Welded Austenitic Stainless Steel Tubing for General Service", ASTM A269, 1992.

"Stainless and Heat-resisting Steel Bars and Shapes", ASTM A276, 1993.

"Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength", ASTM A307, 1992.

"Seamless and Welded Austenitic Stainless Steel Pipes", ASTM A312, 1992.

"Castings, Austenitic, Austenitic-ferritic (Duplex), for Pressure Containing Parts", ASTM A351, 1991.

"Wrought Austenitic Stainless Steel Piping Fittings", ASTM A403, 1991.

"Stainless Heat-resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels", ASTM A479, 1992.

"Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes", ASTM A500, 1990.

"Carbon and Alloy Steel Nuts", ASTM A563, 1992.

"Deformed and Plain Billet-steel Bars for Concrete Reinforcement", ASTM A615, 1992.

"Standard Terminology Relating to Soil, Rock and Contained Fluids, ASTM D653, 1990.

"Steel Wire, Carbon, for General Use", ASTM A853, 1991.

"Concrete Aggregates", ASTM C33, 1992.

"Ready Mixed Concrete", ASTM C94, 1994.

"Portland Cement", ASTM C150, 1992.

"Air-entraining Admixtures for Concrete", ASTM C260, 1986.

"Test Method for Steady-State Heat Flux Measurements and Thermal *Transmission Properties by Means of the Heat Flow Meter Apparatus*", ASTM C518.

"Package Dry, Hydraulic-cement Grout (Nonshrink)", ASTM C1107, 1991.

"Test Method for Compressive Properties of Rigid Cellular Plasitcs", ASTM D1621.

"Test method for Apparent Density of Rigid Cellular Plastics", ASTM D1622.

"Test Method for Water Absorption of Rigid Cellular Plastics", ASTM D2842

"Test Method for Open Cell Content of Rigid Cellular Plastics by Air Pycnometer", ASTM D2856.

"Mineral Insulating Oil Used in Electrical Apparatus", ASTM D3487.

Miscellaneous

Manual of Steel Construction, 9th Ed., American Institute of Steel Construction (AISC), 1989.

"*Recommended Practice*", *American Society of Nondestructive Testing* (ASNT) SNT-TC-1a, 1988.

"Structural Welding Code-steel", American Welding Society (AWS) D1.1, 1992.

"Certification of Welding Inspectors", AWS QC1, 1998.

Manual of Standard Practice, 25th Ed., Concrete Steel Reinforcing Institute (CRSI) MSP-1, 1990.

"Uniform Building Code", International Conference of Building Officials (ICBO), 1991.

"Concrete and Masonry Anchors, Report No. 4627", ICBO Evaluation Services, 1992.

"Pipe Hangers and Supports Fabrication and Installation Practices", Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) SP-89, 1991.

"Control of External Corrosion on Underground or Submerged Metallic Piping Systems", National Association of Corrosion Engineers (NACE) RP0169, 1992.

"Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems", NACE RP0285, 1985.

"National Electric Code", National Fire Protection Association, NFPA-70.

"Road, Bridge, and Municipal Construction" Washington Department of Transportation (WSDOT), M41-10, 1994.

National Electrical Manufactures Association (NEMA)

"Low voltage Cartridge Fuses", FU1.

"Enclosures for Industrial Controls and Systems", ICS6.

"Enclosed Switches", KS1.

"Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit", RN1.

"Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy", WC5.

Underwriters Laboratories (UL)

"Rigid Metal Conduit", UL6

"Thermoplastic-Insulated Wires and Cables", UL83.

"Class R Fuses", UL198E.

"Liquid-tight Flexible Steel Conduit", UL360.

"Grounding and Bonding Equipment", UL467.

"Wire Connectors and Soldering Lugs for Use with Copper Conductors", UL486A.

"Splicing Wire Connectors", UL486C.

"Insulating Tape", UL510.

"Fittings for Conduit and Outlet boxes", Ul514B.

2.2 Waste Characterization

Waste is generated by sampling and analysis activities performed in the 222-S laboratory. The aqueous mixed waste contains very low quantities of inorganic salts, metals, and organic materials. It is classified as low-level mixed liquid radioactive waste with intermediate to high activity. The waste characterization, included in Appendix II, was reviewed to evaluate the compatibility of the wastes and materials. Based on the characterization, it is concluded that the wastes and piping materials are compatible. In addition, the wastes will not be susceptible to ignition, or unstable. They do not react violently with water, or form an explosive mixture.

2.3 Potential for Corrosion Failure

Piping materials for the carrier pipe and encasement piping are schedule 40, 304L stainless steel. This material has been used in similar applications, demonstrating its corrosion resistance. Based on experimental data and past experience with this material, the potential for failure caused by internal corrosion is very low. The potential for failure caused by soil-induced corrosion is also very low. Piping components that are direct buried in the soil will be protected by an induced current cathodic protection system.

Piping installed in the 219-S Facility is of single wall construction. Since the piping is already enclosed by a secondary containment system (the existing concrete vault), double-pipe construction is not warranted. The piping is schedule 40, 304L stainless steel, which has been used successfully in similar applications. Based on experimental data and past experience with this material, the potential for failure caused ~~in~~ internal corrosion is very low. The piping is not in contact with soil, therefore, soil-induced corrosion will not occur.

by KH 5/22/00

2.4 Effects of Vehicular Traffic

Most of the underground piping is located in areas that do not have vehicular traffic passing over the piping. Sections that may have vehicles pass over the top are buried at sufficient depth to prevent damage.

2.5 Foundation Loading

Calculations were performed to determine the suitability of the footings, and pipe supports. These calculations demonstrate that footings and supports are properly designed.

2.6 Effects of Frost Heave

Piping is protected from the potential effects of frost heave. Underground piping is located at depths greater than 36 inches, which is the accepted limit for the frost zone.

2.7 Pressure Effects

Design calculations for both the carrier and containment piping are based on maximum internal pressure of 20 psig and 0 psig respectively. Calculations were performed using a fluid temperature of 90° F degrees. The design pressure selected for the carrier pipe is appropriate, since the piping serves as an atmospheric drain collection and transport system.

Calculated maximum sustained stress for the buried transport piping is 11% of yield strength. Maximum sustained stress includes the effects of the weight of the piping, including contents, and maximum pressure. Therefore, it is concluded that the piping design is sufficient to withstand the effects of internal pressure.

Calculated maximum sustained stress for the collection piping is 14% of yield strength. Maximum sustained stress includes the effects of the weight of the piping, including contents, and maximum pressure. Therefore it is concluded that the piping design is sufficient to withstand the effects of internal pressure.

After the piping is constructed, it will be hydrotested in accordance with ASME B31.3. The collection piping will be air tested at 22 psig, and the buried transport piping will hydro tested at 30 psig.

2.8 Thermal Effects

The piping system was analyzed to determine the effect of heating the pipe from ambient to operating temperature. Resulting maximum stress from this condition is 4% of yield strength for the buried transport piping, and 23% of yield strength for the collection piping. Based on this analysis, the piping system is design with sufficient flexibility to permit thermal growth resulting from the operating conditions.

2.9 Seismic Effects

The piping is designed in accordance with UBC-1991 to withstand seismic zone 2B events. Resulting maximum stress caused by this condition is 9% of yield strength for the buried transport piping, and 12% of yield strength for the collection piping.

3.0 STRUCTURAL INTEGRITY ASSESSMENT CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that the qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

APPENDIX I

(References)

References

For

PROJECT W-087

222-S RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

[1] "Functional Design Criteria Radioactive Liquid Waste Line Replacement, Project W-087", WHC-SD-W087-FDC-001 Rev. 3, 10/12/94.

[2] "Construction Specification 222-S Radioactive Liquid Waste Line Replacement", W-087-C3, 3/28/95.

[3] "Construction Specification 222-S Radioactive Liquid Waste Line Replacement, ", W-087-C4, 3/28/95.

[4] "Construction Specification Project W-087 222-S Radioactive Liquid Waste Drain Line Replacement Cathodic Protection", SCM Consultants, Inc., Kennewick, Washington, 5/12/95.

[5] "Rectifier EN-Rect-5745 Acceptance Test Procedure Project W-087 222-W Radioactive Liquid Waste Drain Line Replacement Cathodic Protection", SCM Consultants, Inc., Kennewick, Washington, 7/11/95.

[6] "Acceptance Inspection Plan for Project W-087 222-S Radioactive Liquid Waste Line Replacement, Construction Forces". IP-W-087-C3-1, 7/5/95.

[7] "Acceptance Inspection Plan for Project W-087 222-S Radioactive Liquid Waste Line Replacement, Construction Management', IP-W-087-C4-1, 7/5/95.

[8] Baumeister, T., Marks Mechanical Engineers Handbook, Mcgraw-Hill, 1992.

[9] Salmon, C. G., and Johnson, J. E., Steel Structures, Design, and Behavior, 3rd Ed., 1990.

[10] "Design Report Summary for Fig. 137N U-Bolt (Normal and Side Loaded)', Grinell Corporation.

[11] "Pipe Hangers", Grinell Corporation Catalog PH87.

[12] Roberson, J., Cassidy, J., and Chaudry, M. H., Hydraulic Engineer, Houghton Mifflin Co., 1988

[13] Computer Program "AutoPipe Ver. 4.5, Engineering Design Automation, 1993.

[14] "Standard Arch-Civil Design Criteria", SDC-4.1 Rev. 12.

[15] Holtz, R. D. and Kovacs, W. D., "An Introduction to Geotechnical Engineering", Prentice-Hall Civil Engineering and Engine4ring Mechanics Series, 1981 .

APPENDIX II

(Waste Characterization)

Waste Characterization

For

PROJECT W-087

222-S RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

Fluid Properties	Operating Range
Temperature	50 degrees F – 90 degrees F
Density	1.0 – 1.05 g/cc
Viscosity	0.3 – 3.0 centipoise
Solids Content	0.0 – 2.0 vol. %
pH	<12.14 (0.014 Molar OH
Nitrite	<0.016 Molar
C1	<0.035 Molar
Organic	No Separable Phase
Pu	<0.01 gm/gal
Radioactive Materials	
Total Alpha	5.0E-06 Ci/1
Total Beta	2.0E-04 Ci/1
Strontium-89/90	3.0E-05 Ci/1
Cesium-137	5.0E-05 Ci/1
Uranium	1.0E-02 g/1
Plutonium	4.0E-06 g/l

APPENDIX III

(Calculations List)

CALCULATIONS LIST

For

PROJECT W-087

222-S RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

"Radioactive Liquid Waste Line Leak Rate Calculation", ICFKH Calc. No. W-087 - P2", 5/25/94

"W-087 Phase II Pipe Stress Analysis for Buried Pipeline", ICFKH Calc. No. W-087-P05, 4/13/95.

"W-087 Phase II Pipe Stress Analysis for Piping in 222S", ICFKH Calc. No. W-087-P06, 4/13/95.

"W-087 Phase II Base Plate Anchor Calculations for Wall Penetrations at 222S and 219S", ICFKH Calc. No. W-087-P7, 4/13/95.

"W-087 Phase II Pipe Support Analysis", ICFKH Calc. No. W-087-P8, 4/13/95.

Flow Calculation for Transfer Line", ICFKH Calc. No. W-087 -- C01, 1994

APPENDIX IV

(Drawing List)

DRAWING LIST

For

PROJECT W-087

222-S RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

Drawing List Area Map, Drawing No. H-2-820829

Civil Alignment T4 and T8, Plan and Profile, Drawing No. H-2-824891.

Civil Miscellaneous Details, Drawing No. H-2-824892.

Piping Plan, Encased Pipe Supports, Drawing No. H-2-824893.

P & ID Liquid Waste Drain Legend, Sheet 1 of 3, Drawing No. H-2-824894.

P & ID Liquid Waste Drain Collection, Sheet 2 of 3, Drawing No. H-2-824894.

P & ID Liquid Waste Drain Collection, Sheet 3 of 3, Drawing No. H-2-824894.

Piping Demolition Plan and Section, Tunnels T-7 and T-8, Drawing No. H-2-824895.

Piping Demolition Plan and Detail, Tunnel T-4, Drawing No. H-2-824896.

Piping Plan for First Floor, Drawing No. H-2-824898.

Piping, Enlarged Plan and Section, Rooms 1A and 1F, Drawing No. H-2-824899.

Piping, Plans Sections and Details, Room 2B, Drawing No. H-2-824900.

Piping Plan Tunnels T-7 and T-8, Drawing No. H-2-824901.

Piping Plan tunnel T-4, Drawing No. H-2-824902.

Piping Section, Tunnels T-7 and T-8, Sheet 1 of 2, Drawing No. H-2-824903.

Piping Sections and Details, Tunnels T-7 and T-8, Sheet 2 of 2, Drawing No. H-2-824903.

Piping Sections tunnel T-4, Drawing No. H-2-824904.

Piping Details tunnels T-4, t-7, and T-8, Drawing No. H-2-824905.

Piping Supports, Sheet 1 of 2, Drawing H-2-824906.

Piping Plan, Drawing No. H-2-824907.

Piping Sections, Drawing No. H-2-824908.

Piping Details and Sections, Drawing No. H-2-824909.

Electrical Site Plan, Drawing No. H-2-824915.

Electrical Plan, Enlarged, Drawing No. H-2-824916.

Electrical Elementary Diagram, Leak Detection, Drawing No. H-2-824917.

Electrical Cathodic Protection Plot Plan, Drawing No. H-2-824918.

Electrical Cathodic Protection Test Station Details, Sheet 1 of 3, Drawing No. H-2-824919.

Electrical Cathodic Protection Anode Distribution box Details, Sheet 2 of 3 Drawing No. H-2-824919.

Electrical Cathodic Protection Anode Installation Details, Sheet 3 of 3, Drawing No. H-2-824919.

Instrumentation, Liquid Waste Drain Leak Detection, Drawing No. H-2-824911.

Instrumentation, Evaluation and Details, Leak Detection, Drawing No. H-2-824912.

RADIOACTIVE LIQUID WASTE LINE REPLACEMENT

PROJECT W-087

INTEGRITY ASSESSMENT REPORT

(Construction of Phase II)

Prepared by:

Mark H. Brown, EIT
&
Gregory S Chinery
Fluor Daniel Hanford Co.
Richland, Washington 99352

Approved by:

James R. Divine, Ph.D., PE
ChemMet, Ltd., PC
West Richland, Washington 99353

For:

Rust Federal Services of Hanford Inc.

January 4, 1999

TABLE OF CONTENTS

INTRODUCTION

1.1 General Comments

This Integrity Assessment Report (IAR) is approved by ChemMet for Rust Federal Services of Hanford Inc., operations contractors and the Department of Energy (DOE), the system owner. The IAR is intended to demonstrate that construction was performed in accordance with the provisions of WAC-173-303-640 (3) (c) through WAC-173-303-640 (3) (h).

1.2 System Description

The Phase II of this project involves the replacement of the 222-S building tunnel transport and collection piping routed to the 219-S building. The systems for tunnels T7 and T8, and T4 are as described below.

- Tunnel T7 & T8 Transport Piping:

  Two new waste transfer pipelines are installed to connect the collection piping located in the basement of 222-S building tunnels and to the piping that ties into Tank 219-S-104 located in the 219-S Facility. The piping begins just inside the battery limits of the 222-S Facility and ends just inside of the battery limits of 219-S Facility. Each pipeline is approximately 165 feet in overall length, and is sloped from the 222-S Facility to the 219-S Facility. The piping system is installed below grade at a minimum burial depth of 36 inches. One line will be used to transfer waste liquid; the other is set aside as a spare and is blind flanged at both ends.

  The underground piping is a double containment design, with electronic leak detection devices permanently installed in a station located near the piping terminus to signal potential leaks. These stations extend from grade to the containment piping using similar pipe materials. Automatic panel board alarms located in the 219-S and 222-S Facilities are provided. If a leak should occur, liquid accumulations can be removed from the containment piping by opening a valve that will route liquid to tank 219-S-104. The carrier pipe is fabricated from 2 inch diameter, schedule 40, 304L stainless steel pipe, with butt welded connections. The encasement pipe is also schedule 40, 304L stainless steel pipe, but its diameter is 4 inches. The underground pipe components are protected with an impressed-current cathodic protection system.

- Tunnel T-4 Transport Piping:

  Two new waste transfer pipelines were installed to connect the collection piping located in the basement of 222-S building tunnels and to the piping that ties into Tank 219-S-104 located in the 219-S Facility. The piping begins just inside the battery limits of the 222-S Facility and ends just inside of the battery limits of 219-S Facility. Each pipeline is approximately 82 feet in overall length, and is sloped from the 222-S Facility to the 219-S Facility. The piping system is installed below grade at a minimum burial depth of 36 inches. One line will be used to transfer waste liquid, while the other is used as a spare, and is blind flanged at both ends.

  The underground piping is a double containment design, with electronic leak detection devices permanently installed in a station located near the piping terminus to signal potential leaks. These stations extend from grade to the containment piping using similar pipe materials. Automatic panel board alarms located in the 219-S and 222-S Facilities are included. If a leak should occur, liquid accumulations can be removed from the containment piping by opening a valve that will route liquid to tank 219-S-104. The carrier pipe is fabricated from 2 inch diameter, schedule 40, 304L stainless steel pipe, with butt welded connections. The encasement pipe is also schedule 40, 304L stainless steel pipe, but its diameter is 4 inches. The underground pipe components are protected with an impressed-current cathodic protection system.

- Tunnel T-7, and T-8 Collection Piping

  Drains from Hot Cells 1A, 1E-1, 1E-2, and 1F are routed to the tunnels collection piping. The drains are located in rooms 1-A, 1-E, and 1-F respectively. Also included are the pump discharge lines from T-7 and T-8 sumps located in the two tunnels. All piping is double encased, with the exception of the 2-inch vent located in T-7 tunnel, and a section of line located in the T-8 tunnel. This section of pipe is used to flush the new line to 219-S, and has been approved by the Department of Ecology, references [1], [2]. All other new piping is 304L stainless steel schedule 40 pipe used for both the carrier pipe and encasement pipe.

carrier pipe and encasement pipe.

Leak detection instrumentation is included in the design. Instruments are installed at the terminus of the collection piping at the point where the collection piping joins the transport piping. In the event of a leak, remote panel board alarms will be activated.

- Tunnel T-4 Collection Piping

  Drains from rooms 1-K, 1-J, and 2-B are routed to the tunnel collection piping. Also included is the pump discharge line from T-4 sump located in the tunnel. All piping is double encased. All new piping, used for both the carrier pipe and encasement pipe, is 304L stainless steel schedule 40 pipe.

  Leak detection instrumentation is included in the design. Instruments are installed at the terminus of the collection piping at the point where the collection piping joins the transport piping. In the event of a leak, remote panel board alarms will be activated.

1.3 Scope

This report applies to the facilities described above in paragraph 1.2. It is based on periodic inspection performed on a scheduled basis by qualified persons. Inspections were performed on the system described using applicable codes, standards, and properly maintained tools.

1.4 Comments on Certification

Paragraph 3.0 contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE) in accordance with WAC-173-303-810 (13)(a).

2.0 ASSESSMENT

The systems described above, paragraph 1.2, are properly installed in accordance with the drawing, specifications, and applicable codes. This assessment is based upon inspection performed by qualified personnel during the construction phase of the project. Discussions of specific considerations follow.

2.1 Weld Breaks

Personnel that joined sections of piping were pre-qualified before performing the work. In-process inspection was employed in accordance with ASME B31.3 to determine the quality of the joints. The inspection process was supervised by an AWS QC1 certified Weld Inspector, supplied by the contractors. In addition, a hydrotest performed in accordance with the applicable piping codes demonstrated that the piping was properly joined. Pneumatic pressure tests were performed after each section of pipe was completed, but prior to burial (for underground piping) so leaks could be visually detected.

2.2 Punctures

The piping pneumatic pressure tests indicate that none exist.

2.3 Scrapes of Protective Coating

Inspections performed during construction indicate that the underground piping outer protective tape was not damaged. Sandbedding, or Controlled Density Fill (CDF) was used during the backfill process.

2.4 Cracks

Based on the inspections and pneumatic pressure tests performed, cracks are not apparent.

2.5 Corrosion

Based on an evaluation of the system, external corrosion is not expected nor known to currently be present. A review of the Functional Design Criteria[1] suggests the possibility of internal corrosion. Strong acids, oxidants, caustics, and miscellaneous organics will be in the piping at various times. Care should be taken that the particular piping is compatible with a given fluid. For example, strong acids should not be alternated with alkaline oxidants in stainless steel, acidic chlorides should not be used in stainless steel, and fiberglass piping is incompatible with some organic solvents as well as with some acids.

2.6 Other Structural Damage

Based on inspection performed during construction, no structural damage is evident.

2.7 Backfill

The underground piping system required to be placed under a minimum cover of earth shielding. The design allowed the use of CDF or sandbedding for one foot around the piping system. CDF was used on the majority of all backfill, and sandbedding on the rest. Soil compaction tests were performed on the sandbedding, and the subgrade. Placement methods were based on the applicable codes.

2.8 Tightness Test

Pneumatic leak tests were performed on the inner carrier piping as each section was completed. Pneumatic tests were performed on the encasement piping prior to backfill, for the underground portion. These tests indicate that the system is leak free. Hydrostatic test pressures were based on the ASME B31.3 piping code, and are as follows: inner carrier pipe and encasement pipe, 22-psig test pressure. Test pressures were held for a minimum duration of 10 minutes.

2.9 Support System

Inspections were performed on 100% of the welding, and a minimum of 10% of the expansion anchor installations in accordance with the specification and drawings. Based on these inspections, the support system is properly installed.

[1] WHC-SD-W087-FDC-001, *Functional Design Criteria Radioactive Liquid Waste Line Replacement, Project W-087*, Rev. 3, Oct. 12, 1994

2.10 Corrosion Protection System

An impressed-current cathodic protection system was installed on the underground stainless steel piping.

3.0 Certification

I certify under penalty of law that this document and all attachments were prepared under my direction in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

JAMES R. DIVINE
STATE OF WASHINGTON
12231
REGISTERED
PROFESSIONAL ENGINEER
8 MAY 00
EXPIRES: 3-11-02

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ATTACHMENT 1

Rust Federal Services of Hanford and Lockheed Martin Hanford Company	MEMORANDUM OF UNDERSTANDING

This memorandum of understanding (MOU) is to document the transfer of ownership from the Project W-087, "222-S Radioactive Liquid Waste Line Replacement" to the facilities that will operate the transfer system. The scope of work covered by this transfer is Phase 1 (the underground line SNL 5350 running from the 219-S facility to the 244-S catch tank). Lockheed Martin Hanford Company, West Tank Farm Operations will assume ownership from the cold face of the 219-S facility to the 244-S catch tank. Rust Federal Services of Hanford, 222-S Laboratory will retain ownership of the portion of the system within the 219-S facility.

Description of Work:
This MOU covers the underground waste transfer system, which includes line (SNL 5350) from the 219-S facility to the 244-S catch tank and associated support equipment.

Exceptions:

1. Complete exception listed on attached Acceptance of Completed Work, 5/20/97.
2. Complete Tank Farms Authorization Basis Amendment Package.
3. Repost radiological signs on underground transfer line within the 222-S complex fence.

Acceptance of Construction:
The work as covered by this project has been completed according to plans and specifications, and the work is ready for transfer to the operating facilities.

M A Cahill
Rust Federal Services of Hanford
Facility Project Manager

Date: 6/26/97

Transfer:
This system is transferred to the operating organizations. These organizations have beneficial use of the system and accept custodian and maintenance responsibilities for the completed work. The project is responsible for ensuring that all exceptions are completed.

Manager, 222-S Laboratory — Date: 6/26/97

Manager, West Tank Farms — Date: 7/7/97

All exceptions have been removed: M A Cahill — Date: 8/11/97

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ATTACHMENT 2

AMERON
INTERNATIONAL

January 27, 1998

Fluor Daniel Northwest, Inc.
1100 Jadwin
P.O. Box 1050
Richland, WA 99352-1050
Attn.: Mr. David McShane PE

Re: Hanford Site KEH 5454, Project W-087, Pipe S1 and S2

Dear Mr. McShane:

This letter is to confirm that Bondstrand 4000 is suitable for carrying a waste stream with the following characteristics:

Temperature	35°F to 125°F
Density	0.0 to 1.1 g/cm^3
Viscosity	0.3 to 3.0 cP
Solid Content	5.0% or less by volume
pH	12 or greater
Nitrite	5.0 E^{-2} Molar or greater
Chloride	1 Molar or less
Organic	No Separable Phases
Total Alpha	2.71 E^{-3} Ci/L or less
Total Beta	1.18 Ci/L or less
Strontium-89/90	2.88 E^{-1} Ci/L or less
Cesium 137	4.10 E^{-1} Ci/L or less
Uranium	3.0 E^{-1} g/L or less
Plutonium	2.0 E^{-3} Ci/L or less

Thank you for considering Bondstrand fiberglass piping systems. Please call me at (940) 569-8660 if I can be of any additional assistance.

Sincerely,

Charles M. Webb

Charles M. Webb
Applications Engineer

cc: N. Lambly

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ORIGINAL

QC INSPECTION REPORT

Report No.	
K064-1	

Work Order No.	Project No.	Inspection Plan No.	Open Item No.	CNCR No.
K064		NA	NA	NA

Title of Work: Assessment of Facility Piping

Reviewed By: [signature] 9/23/99

Description of Inspection Activity and Results (Be explicit and comprehensive)	Acc.	Rej.	Other Documentation
UT thickness measurements in Room 12 at 222S Labs.			
Hood #1			
thickness varied from .150" to .137 on 2" pipe .126" - .121" on 1" pipe			
Hood #2			
thickness varied from .155" to .140" on 2" pipe .131" to .130" on 1" pipe.			
there is some evidence of pitting on bottom ID of pipe since it is hard to lock on for a reading indicating the sound is bouncing around some. Worst case would be estimated at around 10% of wall thickness.			
Approximately 20-25 reading were taken of each Hood.			

Procedure Used: ☐ N/A
- ☐ Visual Weld Inspection
- ☐ Dye Penetrant Testing
- ☐ Leak Testing
- ☐ Concrete Testing
- ☐ Soil Testing
- ☒ Other

Procedure No.: 134-500-8225

M & TE Used: ☐ N/A

Description: Step wedge

Number: 309

Expiration Date: 12-2-99

Inspector	Employee No.	Date
Jon Elliott	17011	9-23-99

A-6003-247 (03/97)

ATTACHMENT 3

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APPENDIX 4B-4

222-S ENVIRONMENTAL HOT CELL EXPANSION INTEGRITY ASSESSMENT REPORT - DESIGN AND CONSTRUCTION, MAY 2000, HNF-4849, REV. 1, FLUOR HANFORD, RICHLAND, WASHINGTON

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S

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 655565

Proj. ECN

2. ECN Category (mark one): Supplemental ○ / Direct Revision ◉ / Change ECN ○ / Temporary ○ / Standby ○ / Supersedure ○ / Cancel/Void ○

3. Originator's Name, Organization, MSIN, and Telephone No.: L.L. Weaver, 8D100, T6-04, 373-5160

4. USQ Required? ○ Yes ◉ No

5. Date: 05/17/00

6. Project Title/No./Work Order No.: 222-S Environmental Hot Cell Expansion IAR, Rev. 1 / 101746

7. Bldg./Sys./Fac. No.: 222-S

8. Approval Designator: E

9. Document Numbers Changed by this ECN (includes sheet no. and rev.): HNF-4849, Rev. 0

10. Related ECN No(s).: N/A

11. Related PO No.: N/A

12a. Modification Work: ○ Yes (fill out Blk. 12b) ◉ No (NA Blks. 12b, 12c, 12d)

12b. Work Package No.: N/A

12c. Modification Work Completed: N/A
Design Authority/Cog. Engineer Signature & Date

12d. Restored to Original Condition (Temp. or Standby ECNs only): N/A
Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ◉ Yes ○ No

Revision of the document to:
- clarify the scope of each of the Integrity Assessment Reports (IARs).
- clarify the material installed by each contractor.
- changed 11A1 to 11A1A and 11A1B on Figure 2.
- added Figure 1, Waste Drain System.
- added Section 3.1, Waste Characteristics

14a. Justification (mark one): Criteria Change ○ / Design Improvement ○ / Environmental ○ / Facility Deactivation ○ / As-Found ◉ / Facilitate Const. ○ / Const. Error/Omission ○ / Design Error/Omission ○

14b. Justification Details: This document was updated to Revision 1 to further clarify the IARs.

15. Distribution (include name, MSIN, and no. of copies)

See Distribution Sheet

RELEASE STAMP

JUL 06 2000
DATE: HANFORD RELEASE
STA: 4
ID: 8

A-7900-013-2 (10/97) A-7900-013-1

ENGINEERING CHANGE NOTICE

Page 2 of 2

1. ECN (use no. from pg. 1): 655565

16. Design Verification Required: ○ Yes ◉ No

17. Cost Impact

	ENGINEERING	CONSTRUCTION
Additional	$ N/A	$ N/A
Savings	$ N/A	$ N/A

18. Schedule Impact (days): Improvement ○ N/A; Delay ○ N/A

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	Tickler File	☐
Environmental Report	☐	Inspection Plan	☐	None	☒
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
N/A	N/A	N/A

21. Approvals

	Signature	Date		Signature	Date
Design Authority	LL Weaver [signature]	6/27/00	Design Agent		
Cog. Eng.			PE		
Cog. Mgr.	SL Brey [signature]	7/5/00	QA		
QA			Safety		
Safety			Design		
Environ.	JA Winterhalder [signature]	7/5/00	Environ.		
~~Other~~	[signature]		Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

A-7900-013-3 (10/97)

HNF-4849
Revision 1

222-S Environmental Hot Cell Expansion Integrity Assessment Report - Design & Construction

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

HNF-4849
Revision 1
ECN 655565

222-S Environmental Hot Cell Expansion Integrity Assessment Report - Design & Construction

L. L. Weaver
Fluor Hanford, Inc

Date Published
May 2000

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

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RECORD OF REVISION	(1) Document Number HNF-4849	Page 1
(2) Title 222-S Environmental Hot Cell Expansion Integrity Assessment Report		

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(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr.	Date
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RS 1	Revise document per ECN 655565.	BSWeaver 6/27/00	StewBy	7/5/00

A-7320-005 (10/97)

PROJECT W-041H
222-S ENVIRONMENTAL HOT CELL EXPANSION

INTEGRITY ASSESSMENT REPORT

DESIGN & CONSTRUCTION

June 16, 2000

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FIGURES

APPENDICES

1. General Comments

The purpose of this report is to document an independent review of the tank system design to meet the requirements of Washington Administrative Code (WAC), Dangerous Waste Chapter 173-303-640(3)(a). This report is also used to document an independent inspection of the tank system installation to meet the requirements of WAC 173-303-640(3)(c) through (h).

This assessment report satisfies the "design and installation of new tank systems or components" certification requirements for Washington Administrative Code (WAC) 173-303-640(3) for Project W-041H, "*222-S Environmental Hot Cell Expansion.*"

This report will be included in the Resource Conservation Recovery Act of 1976 (RCRA) Part B Permit Application for the 222-S Laboratory and is a portion of the integrity assessment of the overall 222-S Laboratory, Radioactive Liquid Waste Disposal System.

2. Scope

This report addresses the integrity assessments that were performed for the design and installation of the new waste lines which were installed as part of Project W-041H, "*222-S Environmental Hot Cell Expansion.*"

There were three separate Integrity Assessment Reports (IARs) prepared by Kaiser Engineers Hanford Company to assess the Waste Drain System provided by Project W-041H. The IARs were certified by an Independent Qualified Registered Professional Engineer (IQRPE). The IARs were prepared for Westinghouse Hanford Company, operations contractor, and the U. S. Department of Energy, the system owner. The IARs received limited distribution and were not issued as released documents. This report consolidates the three IARs into one document as a released document.

The IARs are included as the Appendices of this report. Appendix A provides the original design assessment for the entire waste drain system to be installed by Project W-041H (Figure 1). Appendix B provides an interim construction assessment which documents the inspection of the portion of the drain system installed by the Fixed Price Contractor (FPC) which extends from the Hot Cell facility to approximately five feet north of the outer foundation. Appendix C provides the final construction assessment which documents the inspection of the Construction Forces (CF) portion of the drain line system installation, which connects to the FPC installed line, and extends into Tank 101 at the 219-S Facility. The final assessment also documented the completion of the impressed current cathodic protection system installation and operation.

3. System Description and Operation

Project W-041H, "*222-S Environmental Hot Cell Expansion*", added a new hot cell facility to the east end of the existing 222-S Laboratory (Figure 2). This addition to the facility added approximately 370 square meters (4000 ft^2) of floor space with a large load in/ load out hot cell, five smaller analytical cells, and four new hoods (Figure 3). The large load in/ load out hot cell was partitioned into two areas identified as 11A1A and 11A1B, which are used primarily for the breakdown and extrusion of waste characterization samples. The smaller cells are designated as 11A2 through 11A6, are used primarily as storage cells or analytical process cells.

Each of the partitioned sections of the large cell and each of the smaller cells is equipped with two floor drains that drain to the 219-S Waste Handling Facility via two separate underground drain lines (Figure 1). Each of the drain lines is approximately 85 meters (280 ft) long constructed of 5 centimeter (2 in) diameter pipe encased in a 10 centimeter (4 in) diameter pipe for secondary containment. The secondary containment is provided from the point of origin at the floor of the hot cells to the inner wall surface of the 219-S facility.

The drain lines and encasements are all welded construction using 304-L stainless steel piping. The underground portions of the drain lines are protected from external corrosion by an impressed current cathodic protection system. As indicated in the interim IAR (Appendix B), no protective coating of polyvinyl chloride (PVC) tape was applied to the underground encased drain lines that were installed by the FPC. The decision to not use a protective coating on this section was made, as indicated in the interim IAR, based on the excellent corrosion resistance of the 304L piping, the noncorrosive nature of the backfill material and the use of the impressed current cathodic protection system. As indicated in the construction IAR (Appendix C), a protective coating of PVC tape was applied to the CF portion of the drain line. This was done to provide additional corrosion protection during the period prior to the onset of cathodic protection system operation.

Leak detectors were installed in the secondary containment at the low point in the lines just prior to the penetration into the 219-S facility. The leak detectors are equipped with alarm capability to the 219-S Operating Gallery and to Room 3B in the 222-S Building.

The hot cell drains are used to transfer water flushes generated from the cleaning of equipment used in the extrusion of waste tank core samples. In addition, some unused sample portions and other radioactive liquid wastes are transferred through the drains. Flushing is used to reduce the potential for internal corrosion and extend the life expectancy of the drain lines.

3.1 Waste Characteristics

Since the completion of the W-041H IARs, the approach used in addressing the waste characteristics for this portion of the system has been modified. This section provides information on those modifications as well as acknowledges that the waste characteristic memorandum referenced in Appendix A, Section 2.3.a and Appendix B, Section 2.1 is unavailable.

The modifications recognize that over the effective life of the system, it is not possible to predict the complete makeup of the waste streams generated in the laboratory that will be placed into the tank system. The waste streams generated in the performance of the 222-S Laboratory are very complex and variable. The 222-S Laboratory has applied administrative controls to ensure that incompatible wastes are not introduced into the tank system.

The administrative controls examined two aspects of compatibility; chemical compatibility and system compatibility. Chemical compatibility addresses the potential for chemicals from different waste streams to react within the system and cause a violent reaction (a release of toxic fumes, etc). System compatibility addresses the potential for a waste stream to corrode or degrade a tank system component. Several procedures are integral to the control of both chemical and system compatibility. In summary, 222-S Laboratory procedures allow trained laboratory personnel to place liquids into the tank system. However, each of those procedures requires the Shift Operations Manager's (SOM) approval before any liquids are placed into drains. Before the approval is given to add liquids to the system, a procedure requires the SOM to verify that there is space in the tank system, and that the liquid meets the compatibility requirements of the tank system. A compatibility assessment was developed as the technical basis for determining if a waste is prohibited (i.e. if a waste might corrode or degrade an exposed tank system component). The assessment contains a table that lists each of the tank system components, and the chemicals/concentrations/conditions that harm the components. If the SOM determines that the waste/chemicals/concentrations/conditions are incompatible with a component of the tank system, the SOM will not grant approval for disposal to the 219-S Facility tank system.

All components in the tank system are constructed of materials that are compatible with the waste given the procedural controls described above.

Figure 1
Waste Drain System

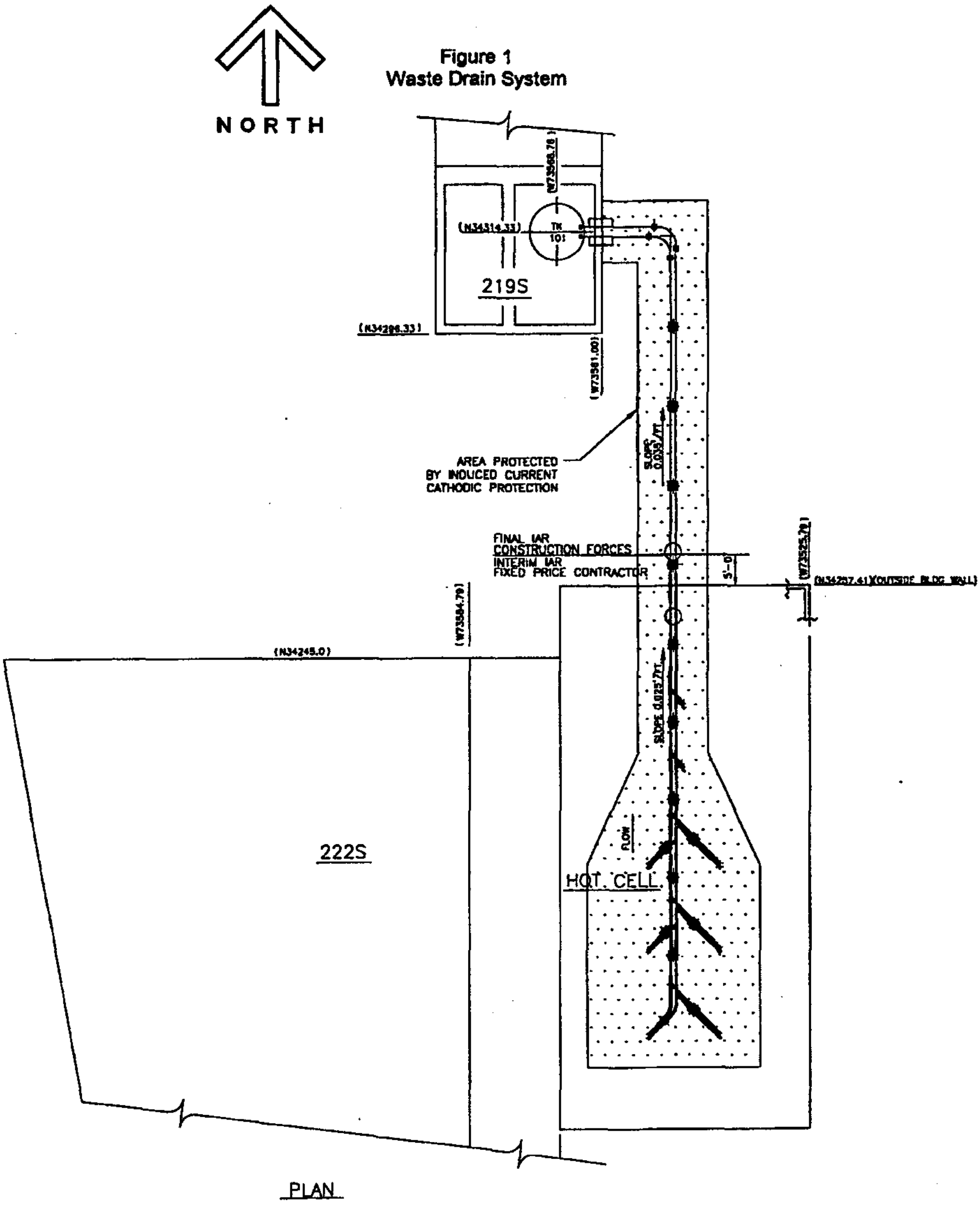


Figure 2.
222-S Laboratory Site Plan

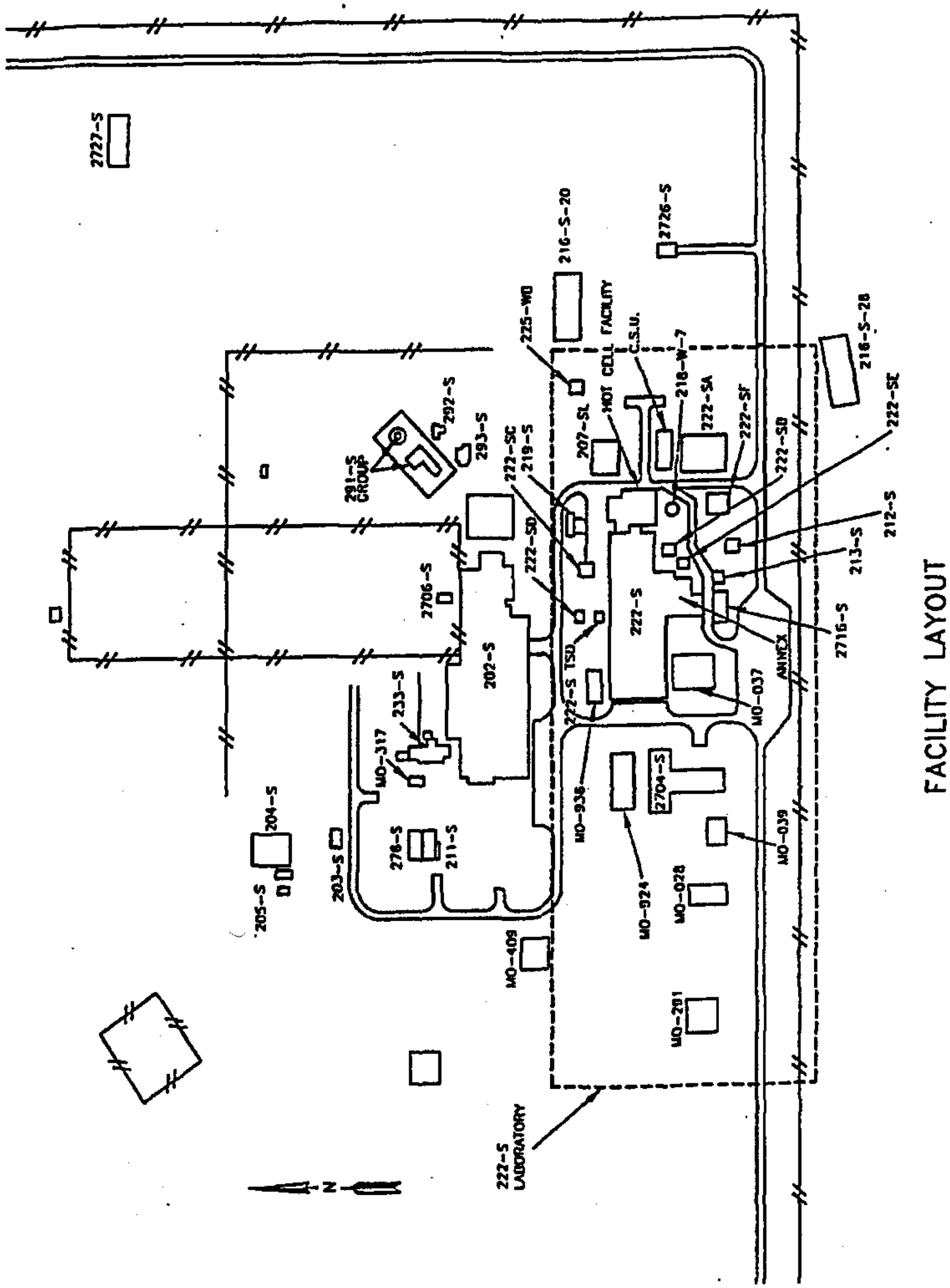
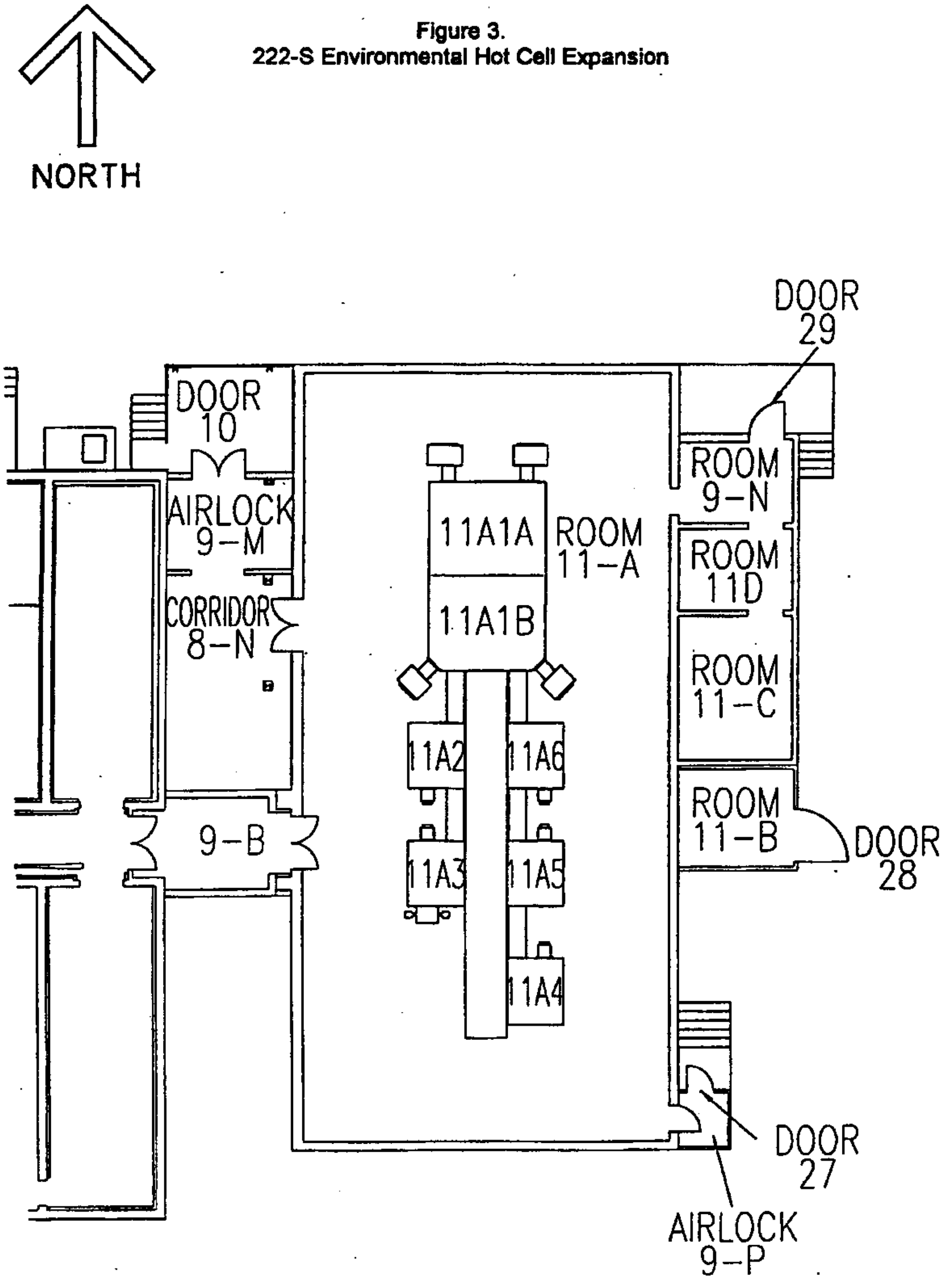


Figure 3.
222-S Environmental Hot Cell Expansion



KAISER ENGINEERS HANFORD	DOCUMENT TRANSMITTAL	Transmittal No. TR-W-041H-AI-20
Date September 14, 1992		Page 1 of 1

To
Distribution

From
K. F. Feigner, E2-40

Project/Work Order Number W-041H

Project/Work Order Title 222-S Environmental Hot Cell Expansion

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222-S ENVIRONMENTAL HOT CELL EXPANSION

PROJECT W-041H

INTEGRITY ASSESSMENT REPORT

(Design Only)

Prepared by:

Kaiser Engineers Hanford Company

Richland, Washington

For the U. S. Department of Energy

Contract DE-AC06-87RL10900

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 This Integrity Assessment Report (IAR) is prepared by Kaiser Engineers Hanford Co. (KEH) for Westinghouse Hanford Co. (WHC), operations contractor, and the Department of Energy (DOE), the system owner. The IAR is prepared in accordance with WAC-173-303-640 (3) (a) and the Integrity Assessment Plan (IAP) dated 7/7/92, TR-W-041H-53. The scope of this IAR is limited to assessing the design of the Waste Drain System described in paragraph 1.2 below and in paragraph 3.0 of the IAP.

1.2 The Waste Drain system is comprised of approximately 280 ln. ft. of 2" diameter 304 L SS pipe encased with 4" diameter 304 L SS pipe. Wastes that are generated during sampling and analysis activities will be collected and transported by the drain piping to Tank (TK 101). This tank is located in a vault that is partially below grade in the 219-S facility. The drain piping will be installed below grade with approximately 150 ln. ft. located beneath the new cell concrete floor.

1.3 Paragraph 3.0 of this IAR contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE).

2.0 STRUCTURAL INTEGRITY ANALYSIS

2.1 This assessment has determined that the waste drain system described above is adequately designed to protect against failures caused by corrosion or structural loads imposed as a result of the systems intended service. Refer to the reference listed in sub-paragraph 2.5.c for a complete description of the intended service. This reference also establishes a design life of 20 years.

2.2 System design is based on the codes and standards listed in sub-paragraph 2.2.a. This assessment is based on review of the calculations listed in sub-paragraph 2.2.b and the construction drawings listed in sub-paragraph 2.2.c.

2.2.a Codes and standards used for design basis,

- Piping Design Code ASME B31.3, 1990
- Uniform Building Code (UBC), 1991
- Control of Pipeline Corrosion by A. W. Peabody, Copyright 1967

- Corrosion Control for Underground Steel Pipelines; A Treatise on Cathodic Protection by J. R. Myers and M. A. Aimone, July 1980
- ASME Paper on "Hand Calculation of Seismic and Thermal Stress in Buried Pipe" by G. C. K. Yeh, Engineering Specialist, Bechtel Power Corp., PVP Volume 77, 6/83
- ASME Paper on "Flexibility Analysis of Buried Pipe" by E. C. Goodling, Supervising Engineer, Gilbed Associates, PVP Volume 82, 6/78

2.2.b Calculations

- Impressed Current Cathodic Protection System, KEH Calc. W-041H-032, 10/24/91
- 4 Inch Encasement Stress Analysis, KEH Calc. W-041H-049, 11/25/91
- 2 Inch. Hot Cell Drain Line, KEH. Calc. W-041H-029, 01/27/92

2.2.c Drawings

- H-2-83237, Sht. 1 of 4, P&ID and Legend
- H-2-83237, Sht. 2 of 4, P&ID and Legend
- H-2-83237, Sht. 3 of 4, P&ID and Legend
- H-2-83237, Sht. 4 of 4, P&ID and Legend
- H-2-83238, Piping Plan
- H-2-83239, Piping Sections and Details I
- H-2-83240, Piping Sections and Details II
- H-2-83241, Piping Plan/Drain Lines
- H-2-83242, Piping Sections and Details III
- H-2-83243, Piping Sections and Details IV
- H-2-83281, Electrical Cathodic Protection Plot Plan
- H-2-83282, Electrical Cathodic Protection Test Station, Details

- H-2-83283, Electrical Cathodic Protection Anode Junction Box Details
- H-2-83284, Electrical Cathodic Protection Anode Installation Details
- H-2-83285, Electrical Cathodic Protection Miscellaneous Details
- H-2-83286, Electrical Cathodic Protection Rectifier Details
- H-2-83181, Civil Site Improvement Demo Plan, Site Plan

2.3 The waste characterization was reviewed to evaluate the compatibility of the materials, and evaluate the potential for corrosion failure. Also evaluated was the potential effects of vehicular traffic, foundation load carrying ability and effects of frost heave. These items are evaluated as follows.

2.3.a Wastes are characterized in the following reference document: DSI C. B. McVey/Al Akerson, 8/24/92

2.3.b Potential for corrosion failure

- Potential for failure resulting from external corrosion is extremely low. The piping is protected with a properly designed cathodic protection system. In addition the materials of construction are 304 L SS.
- Based on the materials of construction, waste characterization, and operating procedure, failure resulting from internal corrosion is unlikely. After the wastes are transferred to the storage tank, the piping is flushed with water. The materials of construction are resistant to the radiation level and acids present.

2.3.c Vehicular traffic will not affect the piping integrity. The piping is buried in the soil and protected with sufficient cover.

2.3.d The piping system does not include a new tank. Therefore tank foundations were not examined. Pipe support structures were evaluated and found to be adequate.

2.3.e Frost heave will not diminish the integrity of the piping. The piping is buried in the soil and protected by sufficient cover.

2.4 Other factors considered in this assessment are internal pressure, thermal growth and seismic events.

2.4.a System failure caused by overpressure is not likely. The maximum internal pressure is determined by the cell air pressure which is produced by the building HVAC equipment. Design pressure is 20 psig.

2.4.b System failure caused by thermal effects is not likely. All of the piping is located underground where the temperature is generally constant and the fluid temperature is near ambient. The system is designed with sufficient flexibility to permit thermal growth resulting from these conditions.

2.4.c The piping system is designed in accordance with UBC-1991 to withstand seismic zone 2B events.

2.5 References

2.5.a DSI C. B. McVey/Al Akerson, 8/24/92

2.5.b Corrosion Field Survey by Ebasco Services, April 1982

2.5.c Functional Design Criteria: SD-W041-FCD-001, Rev. 2, 7/16/91

2.5.d Corrosion Evaluation, Hot Cell Expansion, 200 West Area, Hanford, WA. by Corrosion Control Specialists, 8/27/91

2.5.e WHC Letter of Instruction Number 3, 3/4/91, No. 9151666, WHC to A. W. Akerson

2.5.f Flow of Fluids, Technical paper 410, 1985, Crane Engineering Division

2.5.g KEH Calculation No. B714-043, 12/6/89 (Soil Data for Seismic and Static Analysis)

2.5.h KEH Calculation No. W-041H-049, 11/25/91

2.5.i KEH Calculation No. W-041H-029, 01/27/92

2.5.j KEH Calculation No. W-041H-032, 01/08/92

2.5.k UCRL-15910 Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards, 6/90

2.5.l DOE 6430.1A, 1989

3.0 STRUCTURAL INTEGRITY ASSESSMENT CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

K. F. Feigner, P.E.

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PROJECT W-041H

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(INTERIM)

(Construction Only)

Prepared by:

Kaiser Engineers Hanford Company

Richland, Washington

For the U. S. Department of Energy

Contract DE-AC06-87RL10900

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1.2 The Waste Drain system is comprised of approximately 280 ln. ft. of 2" diameter 304 L SS pipe encased with 4" diameter 304 L SS pipe. Wastes that are generated during sampling and analysis activities will be collected and transported by the drain piping to Tank (TK 101), located in a vault at the 219-S facility. The piping system includes two drain lines installed below grade with approximately 150 ln. ft. located beneath the new cell concrete floor. Presently the piping cathodic protection system anodes, cathodic protection system interconnecting cables, and below grade piping have been completed. The tank tie-in and cathodic protection system rectifier have not been installed. Therefore this assessment is limited to the piping only. Assessment of the cathodic protection system and tank tie-in will be performed upon completion of these elements.

1.3 Paragraph 3.0 of this IAR contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE).

2.0 ASSESSMENTS

2.1 The system, described above, possesses sufficient structural strength and corrosion resistance to prevent failure during the system's intended service. The system design criteria and required service is described in the following:

- DSI C. B. McVey/Al Akerson, 08/24/92
- Functional Design Criteria: SD-W041-FDC-001, Rev. 2, 7/16/91
- WHC Letter of Instruction No. 5, dated 4/17/92, 9252004

Inspections performed during construction demonstrated that the system was properly installed in accordance with the plans, drawings, specifications, and applicable codes. These documents are referenced below. A tightness test performed after construction was completed, demonstrated that the system is leak free.

- Piping Design Code ASME B31.3, 1990
- Uniform Building Code (UBC), 1991
- Department of Energy (DOE) Order 6430.1a, 1989
- Drawing H-2-83237, Sht. 1 of 4, P&ID and Legend
- Drawing H-2-83237, Sht. 2 of 4, P&ID and Legend
- Drawing H-2-83237, Sht. 3 of 4, P&ID and Legend
- Drawing H-2-83238, Piping Plan
- Drawing H-2-83239, Piping Sections and Details I
- Drawing H-2-83240, Piping Sections and Details II
- Drawing H-2-83241, Piping Plan/Drain Lines
- Drawing H-2-83242, Piping Sections and Details III
- Drawing H-2-83243, Piping Sections and Details IV
- Inspection Plan (IP), IP_W-041H-C1-1, Rev. 1, 9/24/92
- Inspection Plan (IP), IP-W-041H-C2-1, Rev. 1, 9/25/92
- Inspection Plan (IP), IP-W-041H-C3-1, Rev. 1, 10/23/92

2.2 The system was thoroughly examined, and it was determined that none of the following defects existed.

- Weld breaks - The system was visually examined and none were observed.
- Punctures - The system tightness test indicated that none existed.
- Scrapes of protective coatings - The piping material is 304 L stainless steel and it is installed using noncorrosive backfill material. Because of the excellent corrosion resistance of 304 L, and the impressed current cathodic protection system, a protective coating is not required. Therefore a coating was not applied, which is in accordance with the plans and specifications.

- Cracks - Based on the inspection and testing performed, no cracks exist. The piping was visually inspected following the completion of construction, in-process inspection was performed during fabrication, and a tightness test was performed.

- Corrosion - External corrosion was not observed during the visual inspection of the system.

- Other structural damage - The system appears to be installed without any structural damage.

2.3 The installation of this system required excavation and the use of backfill. Backfill was comprised of well graded soil materials that are native to the construction site. Compaction was tested in accordance with the applicable code to ensure proper placement. Placement methods were based on the applicable codes.

2.4 A tightness test was performed indicating that the system is leak free. The test was performed in accordance with the applicable code.

2.5 Based on the visual inspection, it was determined that the piping and ancillary equipment is properly supported in accordance with the plans and specifications.

2.6 External corrosion protection is required for this system. However, it is excluded from the scope of this assessment (see paragraph 1.2).

3.0 STRUCTURAL INTEGRITY ASSESSMENT CERTIFICATION

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KARL F. FEIGNER
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KEH 0001.00 (05/94) KEF003

222-S ENVIRONMENTAL HOT CELL EXPANSION

PROJECT W-041H

INTEGRITY ASSESSMENT REPORT

(Construction)

Prepared By:

ICF Kaiser Hanford Company

Richland, Washington

For:

U. S. Department of Energy

Contract CE-AC06-87RL10900

TABLE OF CONTENTS

INTRODUCTION

1.1 General Comments

This Integrity Assessment Report (IAR) is prepared by ICF Kaiser Hanford Co. (ICF KH) for Westinghouse Hanford company (WHC), operations contractor and the Department of Energy (DOE), the system owner. The IAR is intended to demonstrate that construction was performed in accordance with the provisions of WAC-173-303-640(3)(c) through WAC-173-303-640(3)(h).

1.2 System Description

The Waste Drain system includes two drain lines that are buried and protected from soil induced corrosion by an impressed current cathodic protection system. These lines extend approximately 280 ln. ft. and are comprised of 2 inch diameter, schedule 40, 304L stainless steel pipe encased with 4 inch diameter, schedule 40, 304L stainless steel pipe. Wastes that are generated during sampling and analysis activities in the new 222-S hot cell will be collected and transported by the drain piping to tank TK 101, located in an underground concrete vault at the 219-S facility. Electronic leak detection is included in the system to warn of potential leaks that may occur in the carrier pipe. Leaks are indicated by a warning light on the alarm panel in the 219-S building.

1.3 Scope

This report is based on a construction assessment performed on the cathodic protection system and the tank tie-in only.

A design assessment was performed in accordance with WAC-173-303-640(3)(a) for the system described above in paragraph 1.2. Results were reported 9/14/92, ICF KH reference TR-W-041H-AI-20. In addition a construction assessment was performed for the buried piping, excluding the cathodic protection system and tank tie-in, described above. Results were reported 3/8/93, ICF KH reference TR-W-041H-AI-57.

1.4 Comments on Certification

Paragraph 3.0 contains a certificate attesting to the accuracy of the information presented in this report. The certificate is signed and sealed by an Independent Qualified Registered Professional Engineer (IQRPE) in accordance with WAC-173-303-810(13)(a).

2.0 ASSESSMENT

The system described above in paragraph 1.2 is properly installed in accordance with the drawings, specifications, and applicable codes. This assessment is based upon inspections performed by qualified personnel during the construction phase of the project. Discussion of specific considerations follow.

2.1 Weld Breaks

Personnel that joined sections of piping together were pre-qualified before performing the work. In process inspection was employed to determine the quality of the joints. In addition, a hydrotest performed in accordance with the applicable piping code, demonstrated that the piping was properly joined.

2.2 Punctures

The piping hydrotest indicates that none exit.

2.3 Scrapes of Protective Coatings

A PVC tape coating was applied to the exterior of the encasement piping. The tape was intended to protect the piping from corrosion during the period prior to the onset of cathodic protection system operation. Visual inspections were performed to ensure that the coating was not damaged.

2.4 Cracks

Based on the inspections and hydrotest performed, no cracks are apparent.

2.5 Corrosion

Inspections performed during construction indicate that the system has not been damaged by corrosion.

2.6 Other Structural Damage

Based on inspections performed during construction, no structural damage is evident.

2.7 Backfill

Installation of this system required excavation and the use of backfill. Backfill was comprised of well graded soil materials that are native to the construction site. Compaction was tested in accordance with the applicable code to ensure proper placement. Placement methods were based on the applicable codes.

2.8 Tightness Test

A hydrostatic test was performed after construction was completed indicating that the system is leak free. The test was performed in accordance with the applicable code.

2.9 Support System

Inspections were performed to determine whether the support systems for the piping were installed in accordance with the plans and specifications. Based on these inspections, the support systems are properly installed.

2.10 Corrosion Protection System

An impressed current cathodic protection system is installed to protect the underground piping from soil induced corrosion. Inspections and tests were performed to ensure that the system is properly installed and operable.

3.0 Certificate

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

KARL F. FEIGNER
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER

Karl F. Feigner
July 21, 1994

EXPIRES: MAR. 19, 1996

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DISTRIBUTION SHEET

To	From	Page 1 of 1
222-S Laboratory Engineering	222-S Laboratory Engineering	Date 05/01/00
Project Title/Work Order		EDT No. N/A
222-S ENVIRONMENTAL HOT CELL EXPANSION INTEGRITY ASSESSMENT REPORT, REV 1.		ECN No. 655565

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
Central Files (Original)	A3-88	1			
Central Files	A3-88	1			
DOE/RL Reading Room	H2-53	1			
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L. L. Weaver	T6-04	1			
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Appendix 7A

APPENDIX 7A

BUILDING EMERGENCY PLAN

Appendix 11A

APPENDIX 11 A

KNOWN RELEASES AND SOLID WASTE MANAGEMENT UNITS

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APPENDIX 11A

KNOWN RELEASES AND SOLID WASTE MANAGEMENT UNITS

The following releases have occurred within the 222-S Laboratory Complex and are identified in the Waste Information Data System (WIDS).

KNOWN RELEASES

The following release sites will be addressed for dangerous and hazardous constituents under the closure plan for the TSD unit

- UPR-200-W-87, UN-216-W-87, Radioactive Spill from 219-S Filter Housing, UN-200-W-87
- UPR-200-W-137 (222-S Vault Contamination)

WIDS reports for these two release sites are available to Ecology on request.

222-S SOLID WASTE MANAGEMENT UNIT SITES

Solid waste management unit sites fall into two different listings within the HFFACO: Appendix B and Appendix C. Appendix B (HFFACO Section 3.2) sites are the TSD sites and are to be closed as part of the TSD unit. Appendix C (HFFACO Section 3.5) sites are Comprehensive Environmental Resource Conservation Liability Act (CERCLA) operable unit sites and are to be closed as part of an overall operable unit or as a Resource Conservation Recovery Act/CERCLA integrated clean up.

HFFACO 222-S TSD UNIT APPENDIX B SITES

The following WIDS sites are part of the existing 222-S TSD Unit and are addressed in the closure plan (see Chapter 11.0)

- 222 SD, 222-S DMWSA, 222-S TSD Dangerous and Mixed Waste Storage Area
- 200-W-69, 222-S Laboratory Complex
- 200-W-76, Room 2B 222-S Laboratory TSD
- 200-W-144, Room 4E 222-S Laboratory TSD
- 219-S-101, 219-S-TK-101, TK-101 Crib Waste Receiver, 219-S, TK-101 Receiver Tank
- 219-S-102, 219-S-TK-102, 219-S Storage Tank 102, 219-S Primary Treatment Tank TK-102
- 219-S-103, 219-S-TK-103, 219-S Storage Tank 103, 219-S Backup Treatment Tank TK-103, 219-S-104, TK-104
- 219-S-104, 219-S-TK-104, 219-S Storage Tank 104
- 296-S-13, 222-S Stack
- 296-S-21, 222-S Stack
- 296-S-16, 219-S Stack

HFFACO 222-S TSD UNIT APPENDIX C SITES

In accordance with Section 3.5 of the HFFACO, the following sites will be managed under Section 120 of CERCLA. Closure of these sites may occur as part of RCRA/CERCLA integration and are currently not part of the 222-S TSD unit closure plan.

- 207-SL, 222-S Retention Basin, REDOX Lab Retention Basin, 207-SL Retention Basin
- 218-W-7, 222-S Vault
- 216-S-19, 222-S Lab Swamp, 216-SL-1, REDOX Lab Swamp, 216-S-19 Pond

WIDS Sites not Identified in the HFFACO

The following two sites are waste accumulation areas located in Room 4-E and Room 2-B and will be closed in accordance with the 222-S TSD unit closure plan (Chapter 11.0).

- 200-W-46, 222-S Laboratory Room 4-E, 90-Day Waste Accumulation Area, Satellite Accumulation Area
- 200-W-49, 222-S Laboratory Room 2-D, 90-Day Waste Accumulation Area

Appendix 11B

APPENDIX 11B

PARTIAL CLOSURE DOCUMENTATION

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APPENDIX 11B.1

PARTIAL CLOSURE PLAN

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Author	Addressee	Correspondence No.
J. E. Rasmussen, RL W. D. Adair, FDH J. A. Winterhalder, WMH (A. L. Prignano, WMH, 376-1057)	M. N. Jaraysi, Ecology	Incoming:9761944 Xrefs:FDH-9760073.1 WMH-9760073

Subject: TRANSMITTAL OF PARTIAL CLOSURE PLAN FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

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12/23/97

A-6001-538 (11/97) WEF008

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

DEC 18 1997

97-EAP-824

Mr. Moses N. Jaraysi
200 Area Unit Supervisor
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336

Dear Mr. Jaraysi:

TRANSMITTAL OF PARTIAL CLOSURE PLAN FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

Enclosed please find the Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures and the Notice of Deficiency Response Table for Closure Plan for 222-S Dangerous and Mixed Storage Areas Metal Storage Structures. Please respond to this transmittal with a letter indicating approval of the partial closure plan.

The only portions of the 222-S Laboratory Complex treatment, storage, and/or disposal unit undergoing closure at this time are the two structures located on the north side of the 222-S Analytical Laboratory Building. These structures have stored various sized containers of mixed waste and nonradioactive dangerous waste. The structures will be clean closed. The clean closed storage structures will be moved and reused for storage of nondangerous waste materials. The two structures will be replaced and the area and associated container storage capacity will remain within the Part A Permit Application, Form 3. The soil and concrete beneath the structures will not be closed. No postclosure activities will be required.

After completion of the activities described in the attached closure plan, the U.S. Department of Energy, Richland Operations Office (RL) will submit to the State of Washington Department of Ecology (Ecology) copies of the professional engineer's certification, the inspection checklists, the radiation survey plan for the closure, and the radiation survey reports. Final owner and operator certification of this closure action will occur as part of the Part B Permit Application certification.

DEC 1997
Received By
William D Adair

DEC 18 1997

Should you have questions regarding this transmittal, please contact Ellen M. Mattlin, of my staff, on (509) 376-2385.

Sincerely,

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division
DOE Richland Operations Office

EAP:EMM

William D. Adair, Director
Environmental Protection
Responsible Party for
Fluor Daniel Hanford, Inc.

Enclosure:
Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures

cc w/encl:
W. D. Adair, FDH
R. C. Bowman, WMH
A. D. Huckaby, Ecology
S. M. Price, FDH
A. L. Prignano, WMH
J. A. Winterhalder, WMH

PARTIAL CLOSURE PLAN FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

CONTENTS

FIGURES

1.0 INTRODUCTION

This partial closure plan describes the closure strategy, performance standards, and closure activities that will be used to clean close the 222-S Dangerous and Mixed Waste Storage Area storage structures. The only portions of the 222-S Laboratory Complex (222-S) treatment, storage, and/or disposal (TSD) unit undergoing closure at this time are the two structures located on the north side of the 222-S Analytical Laboratory Building. These structures have stored various sized containers of mixed waste and nonradioactive dangerous waste. The two structures will be replaced and the area and associated container storage capacity will remain within the Part A Permit Application (Part A), Form 3. For informational purposes the Part A, Form 3, Revision 3, is attached to this partial closure plan. The soil and concrete beneath the structures will not be closed.

No postclosure activities will be performed as part of this partial closure plan. Clean closure requires that all dangerous and/or mixed waste be removed and disposed in accordance with applicable regulations. Clean closure performance standards are described in Section 6.0. After the waste is removed and the storage structures are confirmed to be noncontaminated or decontaminated, the structures will be clean closed, removed, and replaced with new manufactured structures that meet all applicable storage requirements for dangerous and/or mixed waste. The clean closed storage structures will be moved and reused for storage of nondangerous waste materials. If it is not possible to meet the performance standard for any portions of the structures undergoing closure, those portions will be removed and disposed in accordance with applicable regulations.

2.0 CLOSURE PROCESS

This partial closure plan will be approved by letter from the State of Washington, Department of Ecology (Ecology). The approved partial closure plan will be placed in the Administrative Record.

The closure activities described in this plan will be monitored by an independent registered professional engineer (PE) and the PE will certify at the end of the described process that this plan was followed in the closure of the two storage structures. The storage structures will be considered clean closed and available for unrestricted reuse upon receipt of the PE certification.

A copy of the PE certification will be transmitted to Ecology and placed into the Administrative Record. The approved partial closure plan and the PE certification will become attachments to the Hanford Facility Dangerous Waste Permit Application for the 222-S (Part B), as appendices to chapter 11, Closure and Financial Assurance, currently being reviewed by Ecology. Owner/Operator certification of this partial closure will occur at the time of certification of the Part B for the 222-S Complex.

3.0 222-S DANGEROUS AND MIXED WASTE STORAGE AREA DESCRIPTION

The 222-S Dangerous and Mixed Waste Storage Area consists of two metal storage structures 6.0 meters by 2.4 meters by 2.6 meters. The storage structures have wooden floors and are situated on top of a portion of a concrete pad (Figure 1). One static-flow roof vent is centered in the top of each structure. Each storage structure has a full-width double door at one end. Each storage structure also employs a secondary containment flooring (covering the entire wood floor area) consisting of a stainless steel containment basin covered with a nonslip fiberglass grate that overlies the wooden flooring.

The 222-S Dangerous and Mixed Waste Storage Area receives waste from laboratory operations consisting of both liquid and solid dangerous and mixed waste. All waste is received in 208-liter containers: waste is not added to or removed from the containers while in the 222-S Dangerous and Mixed Waste Storage Area. The lids are not removed while the containers are in the storage area. Containerized liquid waste is labpacked in polyethylene-lined within the 208-liter containers. Solid mixed waste is segregated from liquid waste and packaged in the same manner. The liquid-bearing waste packed in the containers is surrounded by a minimum 2-to-1 ratio (by volume) of absorbent. Each storage structure can hold a maximum of 18 containers. The storage structures remain locked except during inspections, waste deposition, or waste removal.

4.0 WASTE INVENTORY

This section describes the volume and characteristics of waste stored in the two storage structures.

4.1 WASTE VOLUME

The combined maximum potential storage volume for both storage structures being closed is estimated to be 7,490-liters (36 208-liter containers). Because most of the containers are labpacks consisting of waste and absorbent material, the actual maximum waste volume is much less. The estimated operating capacity for both storage structures is 2,050 liters (assuming 57 liters of liquids per container).

4.2 WASTE CHARACTERISTICS

Dangerous and/or mixed waste generated from operations of the 222-S Laboratory Analytical and 222-SA Standards Laboratories are stored in the 222-S Dangerous and Mixed Waste Storage Area. This waste consists of the following waste categories:

- Lead Waste--consisting of radioactively contaminated lead shielding, scrap lead, and flat lead sheets.

- Chemical Waste--consisting of outdated or off-specification (both solid and liquid) chemicals managed as dangerous waste. Waste from the 222-S Analytical Laboratory consists of: (1) discarded chemical products, (2) toxic or persistent waste, or (3) characteristic waste.

- Liquid Organic Waste--consisting of waste resulting from radiochemical separation methods and organic analyses of volatile, semi-volatile, pesticide, and polychlorinated biphenyl compounds generated during daily laboratory operations. This liquid organic waste includes liquid scintillation cocktails, consisting primarily of 1,2,4-trimethylbenzene (pseudocumene), discarded environmental and process characterization samples, and outdated or off-specification chemical reagents.

- Occasional Waste--consisting of rags, paper towels, disposable pipettes, contaminated gloves, and other miscellaneous materials associated with the performance of analytical methods. This type of waste is collected separately, segregated from nondangerous dry waste, and managed as an non-specific (F listed) waste. A second example of occasional waste is waste oil generated from maintenance of vacuum pump systems, entrainer units, elevator blower fans, and continuous oilers. This waste could have lead, cadmium, and polychlorinated biphenyls present in the oil.

5.0 CLOSURE STRATEGY

The operating records for the 222-S show no documented spills in the 222-S Dangerous and Mixed Waste Area storage structures. Clean closure is based on confirmation of no spills or leaks of dangerous waste into or onto components undergoing closure. These components are the interior metal walls, the fiberglass grate, the stainless steel containment basin, and the wood floor. (The outside walls and roofs of the storage units will not be required to meet any performance standards.) Any component or portion of a component suspected to be contaminated with dangerous waste or waste residue will be decontaminated and re-examined. Any component or portion of a component unable to be cleaned sufficiently to meet performance standards will be removed and disposed in accordance with applicable regulations.

Contamination scenarios other than superficial contamination are unlikely because the exposed interior surfaces of the storage structures are steel, and waste is containerized. Also, the 222-S Dangerous and Mixed Waste Storage Area is inspected weekly.

The concrete pad and soil beneath the structures will not be closed as part of this effort. The concrete pad and soil beneath the unit will remain in the 222-S TSD unit.

The closure activities that will be performed include the following:

- Perform document review and interview of personnel

- Remove waste inventory from the structures

- Perform a radiation survey and visual inspection of the surfaces
- Decontaminate, as necessary, if survey or inspection indicates potential contamination
- Perform a verification radiation survey and visual inspection
- Remove and dispose of all portions of the structures that cannot meet the performance standards (specified in Section 6.0)
- Obtain a PE certification of closure.

6.0 CLOSURE PERFORMANCE STANDARDS

Clean closure, as provided for in this plan, and in accordance with Washington Administration Code (WAC) 173-303-610(2), will control, minimize, or eliminate to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere.

The operating records for the 222-S show no documented spills in the 222-S Dangerous and Mixed Waste Storage Area storage structures. Clean closure is based on confirmation of no spills or leaks of dangerous waste into or onto components undergoing closure. The performance standard for all surfaces will be no measurable amounts of radiological contamination above background and no obvious visual signs of contamination.

All surfaces examined will be surveyed for radiological contamination. Radiological contamination will be used to indicate the potential presence of dangerous waste contamination. The performance standard for radiological contamination is measurable amounts of radiation above background levels.

A visual inspection also will be performed on the metal surfaces. Evidence of potential dangerous waste contamination will include, but will not be limited to, discoloration or material degradation, such as pitting due to corrosion, wetness, and staining. The performance standard for the visual inspection is no obvious signs of potential dangerous waste contamination.

The surface will be considered free of dangerous waste contamination if there is no measurable amounts of radiological contamination above background levels and no obvious visual signs of potential dangerous waste contamination.

7.0 GENERAL CLOSURE ACTIVITIES

This section describes the specific activities that will be employed to implement the closure strategy and meet the clean closure performance standards. Activities will be documented on an inspection checklist (attached). Closure activities could be performed individually on each storage structure. Any areas not obtaining clean status will be removed and disposed.

As required in the following sections a radiation survey plan will be prepared for activities associated with this partial closure. The plan will be prepared prior to performing the associated activities. The plan will be made available to Ecology for informational only purposes upon request.

7.1 REMOVAL OF WASTE INVENTORY

As a first step of closure, all containers of waste will be removed from the storage structures. The containers of waste will be transferred to another permitted onsite TSD unit or permitted offsite facility for storage. The waste could be moved out of the storage structures at different times, first removing the containers from one of the structures. This would allow some containers to be moved into the still active structure, while the other structure undergoes closure activities.

7.2 INSPECTION

After removal of the waste containers, a radiation survey will be performed on the interior walls, the fiberglass grate, the stainless steel containment basin, and the wood floor. Any area showing measurable radiological levels above background levels will be noted for closer examination during the visual inspection.

A visual assessment of whether spills have occurred within the 222-S Dangerous and Mixed Waste Storage Area will be performed after all waste has been removed. The visual inspection also will include evaluation to the extent possible of the interior walls, the stainless steel containment basins, the fiberglass grate, and wood floors. (Photographs of the components will be taken during visual inspections and included with inspection checklist.) For areas that show potential dangerous waste contamination, field personnel will determine whether to remove and dispose or to decontaminate.

7.3 DECONTAMINATION

If necessary, to allow sufficient time for installing the new storage structures, the storage structures undergoing closure could be moved before decontamination. If movement of the existing storage structures becomes necessary before decontamination, the structures will be placed on a liner (e.g., 10 mil plastic) as near as possible to their original location. A radiation survey will be performed on the area where the liner will be placed. The liner and the structures will only be moved to a location that is at or below background radiation levels. A proposed location for the structures, west of the 222-S Laboratory and north of the 222-SA Laboratory, is noted in Figure 2.

If the radiation survey and visual inspection indicate areas of potential dangerous waste contamination, the component or portion of component will be decontaminated. The method of decontamination used will depend on the nature of the area of potential contamination. Decontamination methods might include wiping, washing, brushing, or scrubbing, and rinsing with water or other appropriate method.

The most likely areas of potential contamination would be on the containment basin, fiberglass grates, or wood floor. If the grates require decontamination, the grates will be surface wiped while still in place over the containment basins. Following initial grate cleaning, rinse water will be applied to the grate over the area of potential contamination and will be collected within the containment basin. Following initial decontamination, the grate either will be removed or raised to enable access to the underlying containment basin, which also will be decontaminated. Accumulated decontamination rinsate will be removed from the containment basin by sponges, mops, pump, or vacuum truck, depending on the quantity of rinsate generated. Solid decontamination residue will be swept up. Decontamination methods for the wood floor might include wiping, washing, brushing, scrubbing, or other appropriate method.

7.4 VERIFICATION INSPECTION

After decontamination, all areas of potential dangerous waste contamination will be radiation surveyed and visually inspected as per Section 7.2. For areas that continue to show potential dangerous waste contamination, field personnel will determine whether to repeat decontamination procedures. Once the radiation survey and visual inspection indicate no areas of potential dangerous waste contamination, the structures will be considered clean. Any areas not obtaining clean status will be removed and disposed.

7.5 MATERIAL REMOVED DURING CLOSURE

Decontamination waste, treatment residue, and/or closure debris will be placed in containers at appropriate areas (e.g., satellite accumulation areas) at the unit. When full, these containers will be moved to a designated accumulation area at the unit to await designation in accordance with WAC 173-303-070 and disposal. Containers used for transfer of regulated materials will be U.S. Department of Transportation-approved containers compatible with the waste being shipped offsite under manifest according to WAC 173-303-180 and WAC 173-303-190 or transferred to an onsite TSD unit.

8.0 CLOSURE SCHEDULE *

Activity	Proposed Completion date
Remove waste inventory	December 15, 1997
Move structures, if necessary	December 23, 1997
Inspection/decontamination/ verification, as necessary	January 15, 1998
Relocate structures	February 16, 1998

* Proposed completion date subject to change with Ecology notification.

9.0 CERTIFICATION OF CLOSURE

PE certification of closure will cover only the portions of the 222-S covered by this partial closure plan, specifically the two structures of the 222-S Dangerous and Mixed Waste Storage Area. The PE certification will occur upon disposition of decontamination generated waste and completion of all partial closure activities summarized in Section 5 and described in Section 7.0. The PE shall provide a signed statement that meets the applicable requirements of WAC 173-303-610(6), certifying that the closure activities were performed in accordance with the technical specifications of the approved partial closure plan. A copy of the PE certification will be transmitted to Ecology, placed in the Administrative Record, and provided as an appendix to Chapter 11, Closure and Financial Assurance in the 222-S Part B permit application.

The PE will certify that the unit has been closed in accordance with the approved partial closure plan. The PE certification is to confirm that the activities took place as described. The PE is not responsible for corroborating information on any part of the partial closure plan not addressing activities completed in support of closure.

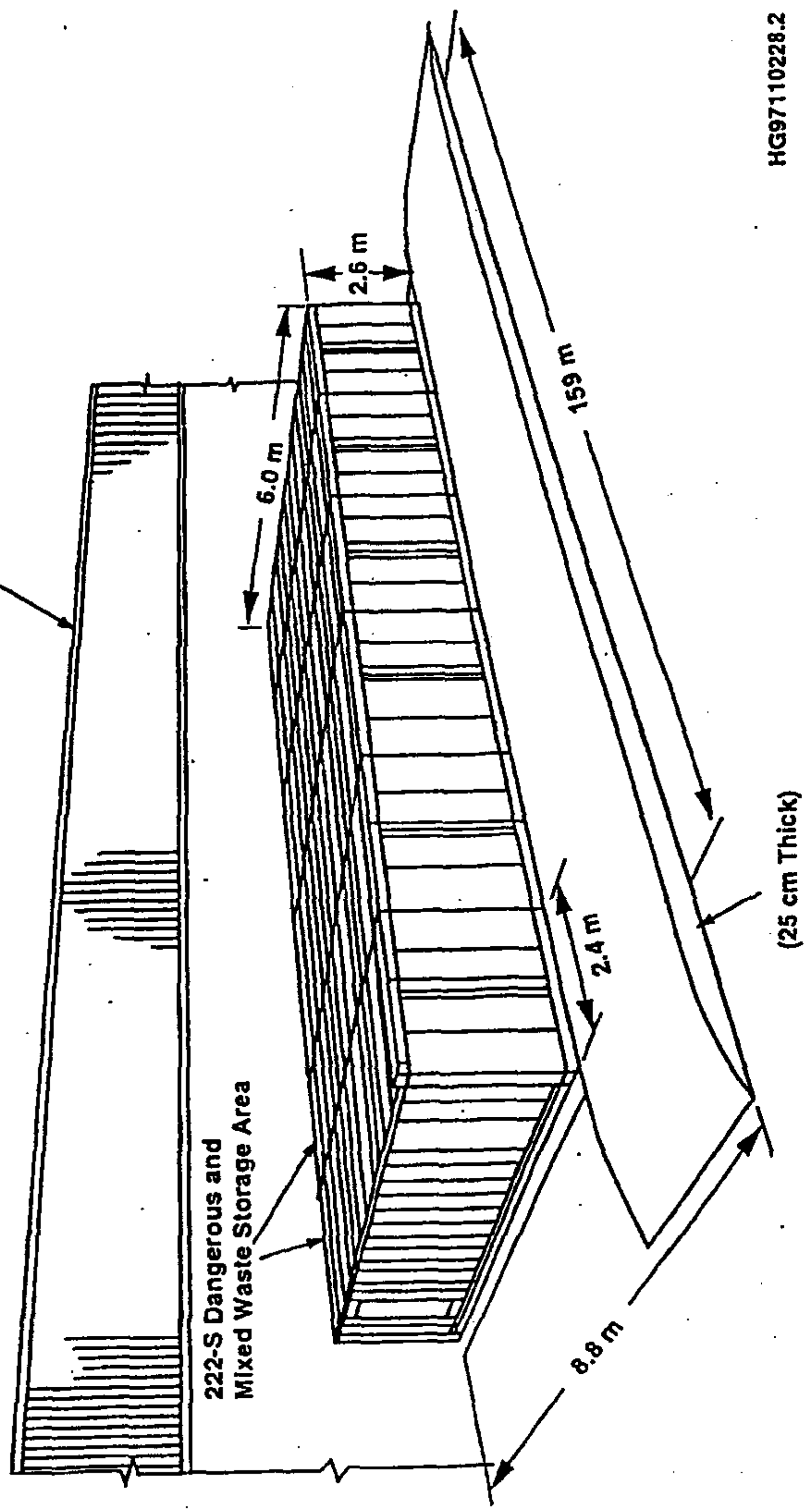

Figure 1. 222-S Dangerous and Mixed Waste Storage Area Storage Structures.

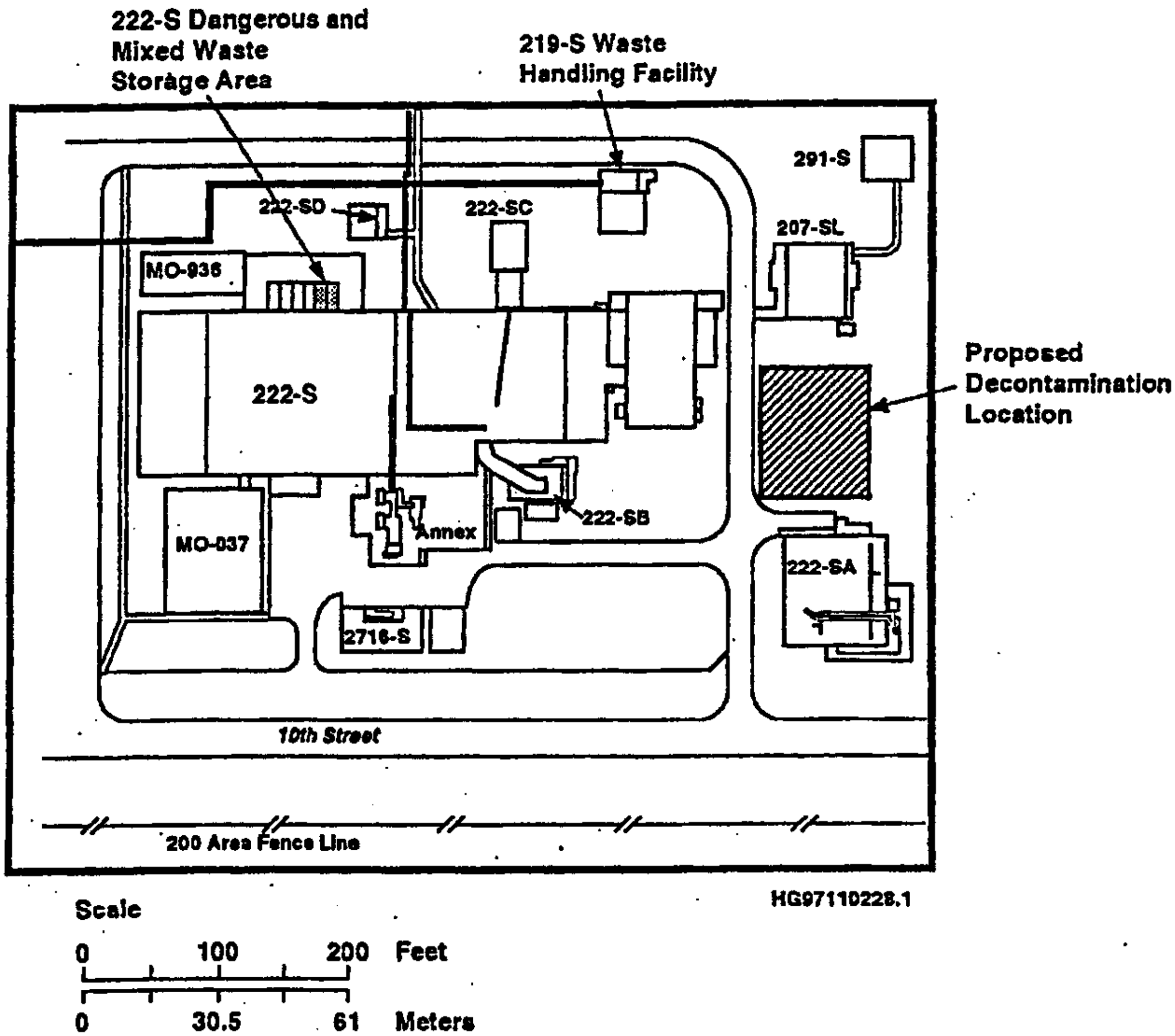

Figure 2. Proposed Storage Structure Decontamination Location.

EXAMPLE

INSPECTION CHECKLIST FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

1. Storage structure identification: ____________________

2. Component description (e.g.. wall, wood floor): ____________________

3. Material (e.g.. wood, metal): ______________________________

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: ____________ time: ____________

4. Radiation survey performance standard met? (at or below background): ____________

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): ____________________

6. Comments on survey/inspection (or N/A if not applicable): ____________
____
____
____

7. If photographs taken, attach

DECONTAMINATION, if required
date: ____________ time: ____________

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background): ____________

9. Decontamination method used (or N/A): ____________________
____
____
____

10. Comments on decontamination (or N/A): ____________________
____
____
____

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: __________ time: __________

12. Radiation survey performance standard met? (at or below background)
____

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): __________

14. Comments on verification inspection (or N/A): __________
____
____
____

15. If photographs taken, attach.

WITNESSES:

Print: name and title	Signature / Date
Print: name and title	Signature / Date
Print: name and title	Signature / Date

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APPENDIX 11B.2

ECOLOGY APPROVAL LETTER

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CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No.
A. D. Huckaby, Ecology	Distribution	9854054

Subject: 222-S LABORATORY COMPLEX DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES CLOSURE PLAN (WA7890008967) (TSD: TS-2-1)

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D. B. Van Leuven	H6-10	
G. J. Warwick	T6-12	
J. L. Westcott	T3-04	
J. F. Williams, Jr.	H6-24	
R. T. Wilde	H6-10	
Administrative Record: 222-S Lab Complex	T6-20	
Central Files: 222-S Lab	T6-20	

Dist 5/7/98
Law

54-6000-117 (9/88) WEF008

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
1315 W. 4th Avenue • Kennewick, Washington 99336-6018 • (509) 735-7581

March 12, 1998

Ms. Beth Bilson
U.S. Department of Energy
P.O. Box 550, MSIN: S7-41
Richland, WA 99352

Mr. James E. Rasmussen
U.S. Department of Energy
P.O. Box 550, MSIN: A5-15
Richland, WA 99352

Mr. William Adair
Fluor Daniel Hanford, Inc.
2440 Stevens Center, MSIN: H6-21
Richland, WA 99352

Mr. David Van Leuven
Waste Management Hanford, Inc.
P.O. Box 700, MSIN: H6-10
Richland, WA 99352

Dear Ms. Bilson, Mr. Rasmussen, Mr. Adair, and Mr.Van Leuven:

Re: 222-S Laboratory Complex Dangerous and Mixed Waste Storage Area Storage Structures Closure Plan (WA7890008967) (TSD: TS-2-1)

The Washington State Department of Ecology (Ecology) has received and reviewed the U.S. Department of Energy's (USDOE) above-referenced closure plan submitted December 18, 1997.

This letter represents Ecology's approval of the closure plan which describes closure specifications for the two Dangerous and Mixed Waste Storage Area structures located on the north side of the 222-S Analytical Laboratory Complex building.

Ecology would like to take this opportunity to commend USDOE and its contractors for the efficient manner in which the closure plan was developed, revised, and finalized.

9854054

Ms. Bilson, Mr. Rasmussen, Mr. Adair, and Mr.Van Leuven
March 12, 1998
Page 2

If you have any questions regarding this approval, please contact me at (509) 736-3034.

Sincerely,

Alisa D. Huckaby

Alisa D. Huckaby, S Plant Project Manager
Nuclear Waste Program

AH:ch

cc: Elizabeth Bowers, USDOE
Ellen Matlin, USDOE
Kathy Tollefson, WMH
Jay Warwick, WMH
Joel Williams, WMH
Mary Lou Blazek, ODOE
Administrative Record: 222-S Laboratory Complex

bcc: Ron Skinnarland, Ecology
Alex Stone, Ecology
Central Files: 222-S Lab

APPENDIX 11B.3

PROFESSIONAL ENGINEER CERTIFICATION

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CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No.
J. A. Winterhalder, WMH (A. L. Prignano, 376-1057)	H. E. Bilson, RL	WMH-9853525

Subject: TRANSMITTAL OF PROFESSIONAL ENGINEER CERTIFICATION FOR THE PARTIAL CLOSURE OF THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

DISTRIBUTION

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		Waste Management Federal Services of Hanford, Inc.		
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X RHE	5-7-98	R. H. Engelmann	H6-26	
X ALP	4/23/98	A. L. Prignano	H6-24	
		D. L. Renberger	T3-03	
X ALP for KST per	5/6/98 cc:mail	K. S. Tollefson	T6-12	
		D. B. Van Leuven	H6-10	
		G. J. Warwick	T6-12	
		J. F. Williams Jr.	H6-24	
		J. A. Winterhalder	H6-21	X
		M. T. Yasdick	H6-10	
		RCRA	H6-21	
		ALP LB	H6-26	X
		U.S. Department of Energy, Richland Operations Office		
		C. E. Clark	A5-15	
		P. K. Clark	S7-55	
		E. M. Mattlin	A5-15	

A-6001-538 (01/95) WEF008

Waste Management Federal Services of Hanford, Inc.

P.O. Box 700
Richland, WA 99352-0700

May 12, 1998

WMH-9853525

Ms. H. E. Bilson, Director
Waste Programs Division
U.S. Department of Energy S7-41
Richland Operations Office
Post Office Box 550
Richland Washington 99352

Dear Ms. Bilson:

TRANSMITTAL OF PROFESSIONAL ENGINEER CERTIFICATION FOR THE PARTIAL CLOSURE OF THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

References: (1) Letter, Alisa D. Huckaby, Ecology, to Beth Bilson, RL, James E. Rasmussen, RL, William Adair, FDH, and David Van Leuven, WMH, "RE: 222-S Laboratory Complex Dangerous and Mixed Waste Storage Area Storage Structures Closure Plan (WA7890008967) (TSD: TS-2-1)," dated March 12, 1998.

(2) Letter, James E. Rasmussen, RL, and William D. Adair, FDH, to Moses N. Jaraysi, Ecology, "Transmittal of Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures," 97-EAP-824, dated December 18, 1997.

Attached is a transmittal letter, a Professional Engineer certification, and supporting documentation (the inspection checklists, the radiation survey plan for the partial closure, and the radiation survey reports) for the Partial Closure Plan for the 222-S Laboratory Complex Dangerous and Mixed Waste Storage Area Storage Structures for submittal to the State of Washington, Department of Ecology (Ecology). The partial closure plan was submitted in December 1997 (Reference 2) and was approved by Ecology in March 1998 (Reference 1). The transmittal of the attached documents to Ecology is required by Reference 2.

The attached information will also be included in the Part B Permit Application. Final owner and operator certification of this closure will occur as part of the Part B Permit Application certification (Reference 2).

The only portions of the 222-S Laboratory Complex treatment, storage, and/or disposal unit that underwent partial closure were two structures located on the north side of the 222-S Analytical Laboratory Building. These structures had stored various sized containers of mixed waste and nonradioactive dangerous waste. As part of the closure activities the structures were removed from the area and replaced. The area and associated container storage capacity remain within the Part A Permit Application, Form 3. The soil and concrete beneath the structures were not closed. No postclosure activities are required. Photographs taken during partial closure activities are being maintained with the 222-S Laboratory Complex operating records.

Please transmit the package to Ecology by May 19, 1998, in order to meet the 60-day requirement in Washington Administrative Code 173-303-610(6).

Should you have any questions, please contact Dr. A. L. Prignano of my staff on 376-1057.

Very truly yours,

John A. Winterhalder, Manager
Environmental Services

kfc

Attachments

WMH-9853525

ATTACHMENT

Transmittal Letter to
Moses N. Jaraysi, Ecology

Consisting of 40 pages,
including cover page

Mr. M. N. Jaraysi
200 Area Unit Supervisor
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West Fourth Avenue
Kennewick, Washington 99336

Dear Mr. Jaraysi:

TRANSMITTAL OF PROFESSIONAL ENGINEER CERTIFICATION FOR THE PARTIAL CLOSURE OF THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

References: (1) Letter, Alisa D. Huckaby, Ecology, to Beth Bilson, RL, James E. Rasmussen, RL, William Adair, FDH, and David Van Leuven, WMH, "RE: 222-S Laboratory Complex Dangerous and Mixed Waste Storage Area Storage Structures Closure Plan (WA7890008967) (TSD: TS-2-1)," dated March 12, 1998.

(2) Letter, James E. Rasmussen, RL, and William D. Adair, FDH, to Moses N. Jaraysi, Ecology, "Transmittal of Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures," 97-EAP-824, dated December 18, 1997.

Enclosed please find the Professional Engineer certification, and supporting documentation (the inspection checklists, the radiation survey plan for the partial closure, and the radiation survey reports) for the Partial Closure Plan for the 222-S Laboratory Complex Dangerous and Mixed Waste Storage Area Storage Structures. The partial closure plan was submitted in December 1997 (Reference 2) and was approved by Ecology in March 1998 (Reference 1).

The enclosed information will also be included in the Part B Permit Application. Final owner and operator certification of this closure will occur as part of the Part B Permit Application certification (Reference 2).

Mr. M. N. Jaraysi . -2-

The only portions of the 222-S Laboratory Complex treatment, storage, and/or disposal unit that underwent partial were two structures located on the north side of the 222-S Analytical Laboratory Building. These structures had stored various sized containers of mixed waste and nonradioactive dangerous waste. As part of the closure activities the structures were removed from the area and replaced. The area and associated container storage capacity remain within the Part A Permit Application, Form 3. The soil and concrete beneath the structures were not closed. No postclosure activities are required. Photographs taken during partial closure activities are being maintained with the 222-S Laboratory Complex operating records.

Should you have questions regarding this transmittal, please contact Ms. E. M. Mattlin, of my staff, on (509) 376-2385.

Sincerely,

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division

Enclosure

cc w/encl:
A. Huckaby, Ecology
R. Jim, YIN
D. Powaukee, NPT
J. Wilkinson, CTUIR

w/o encl:
W. Adair, FDH
R. Bowman, WMH
R. Engelmann, WMH
C. Mattsson, FDH
A. Prignano, WMH
J. Winterhalder, WMH

ENCLOSURE

Professional Engineer Certification for the Partial Closure of the 222-S Dangerous and Mixed Waste Storage Area Storage Structures and supporting documentation

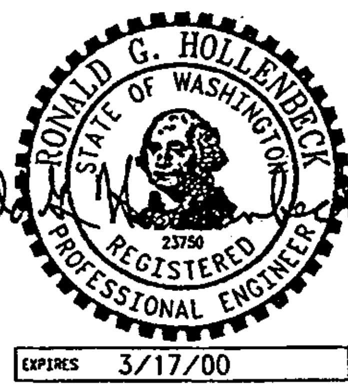
Consisting of 37 pages, including cover page

PROFESSIONAL ENGINEER'S CERTIFICATION STATEMENT

222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

The undersigned hereby certifies that all closure activities for the '222-S Dangerous and Mixed Waste Storage Area Storage Structures' were performed in accordance with *Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures.*

Ronald G. Hollenbeck, P.E.
Washington #23750
Fluor Daniel Northwest



9-10-98

SPECIFICATIONS AND LIMITATIONS OF PROFESSIONAL ENGINEER'S CERTIFICATION

CLOSURE CERTIFICATION FOR 222-S DANGEROUS AND MIXED WASTE STORAGE AREA STORAGE STRUCTURES

Closure of the 222-S dangerous and mixed waste storage area storage structures was authorized by the Washington State Department of Ecology (Ecology) in a letter dated March 12, 1998. The closure was to be performed in accordance with "Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures" (December, 1997).

This certification was based on review of the closure documents provided to the certifying engineer at the beginning of closure activities. Another document entitled "Survey Plan for Release, Removal and Replacement of the 222-S Dangerous and Mixed Waste Storage Structures (Conex Boxes)" was prepared to provide step by step radiological survey instructions. The document was prepared in accordance with the closure plan. Ecology reviewed the survey plan before final approval.

This review was conducted in accordance with WAC 173-303-610(6) to independently certify that the closure activities were performed in accordance with the approved closure documents. This review does not certify the appropriateness of the closure requirements. Periodic site visits, phone conversations and document reviews were conducted to observe and document the closure activities.

All of the requirements of the closure documents have been met. This certification is issued with no exceptions or deviations.

FIELD TRIP REPORT

Project No.	Project Title: 222S Storage Structure Closure	
Date: 3-3-98	Time Departed FDNW: 12:50 P	Time Returned FDNW: 3:15 P
Prepared By: R Hollenbeck	Department: Environmental	
Areas Visited: 222S at 200 W	Person(s) Contacted: Kathy Tollefson, Marty Martin	

Purpose of Trip

Certification of closure activities

Field Report Summary

The connex box doors were open and all waste was removed. The SST containment basins and fiberglass grating was still inplace. The accessabe exterior of the boxes was tested for contamination by large area wipes. No contamination was found. The concrete pad where the contamers are to be moved was tested for back ground radiation. The slab was clear of equipment, some gravel/sand covered small areas.

RH 3-4-98

Pictures Taken

Follow-up Requested

Distribution

FIELD TRIP REPORT

Project No.	Project Title: 222S Storage Structure Closure
Date: 3-4-98	Time Departed FDNW: 12:15 P / Time Returned FDNW: 3:15
Prepared By: R Hollenbeck	Department: Environmental
Areas Visited	Person(s) Contacted

Purpose of Trip

Closure Certification

Field Report Summary

Conmar boxes were lifted with a forklift. Smears were taken from the bottom, end and side. White plastic was laid over slab area where boxes were to be placed. Boxes were moved by truck to the new location and were placed onto the plastic. The concrete where the boxes were moved from was surveyed with LAW.

R H Hollenbeck 3-5-98

Pictures Taken

Follow-up Requested

Distribution

FIELD TRIP REPORT

Project No.	Project Title: 222 S Storage Structure Closure
Date: 3-5-94	Time Departed FDNW: 9:15 / Time Returned FDNW:
Prepared By: RG Hollenbeck	Department: Environmental
Areas Visited: 222S 200 West	Person(s) Contacted:

Purpose of Trip

Closure Certification activity

Field Report Summary

LAW were performed on interior exposed surfaces of the connex boxes and grating. The wipes were checked for alpha beta and gamma. The exposed interior surfaces and grating were visually inspected for discoloration and other signs of spills or contamination. The walls ceiling and grating were spot checked with α B and Y detectors. The grating was removed and the bottom surface was checked for rad contamination. The grating was stacked on plastic sheeting. The containment basins were checked for radiation. The rear middle and right sections of the containment basin for box #2 showed signs of dampness

~~Pictures Taken~~

or oiliness. The residue in these sections is to be picked up and analyzed. The basin will be washed. No ~~ra~~ rad contamination was found on the sst basin

Follow-up Requested

Distribution

FIELD TRIP REPORT

Project No.	**Project Title** 222S Storage Structure Closure
Date 3-12-98	**Time Departed FDNW** 12:15 / **Time Returned FDNW** 2:40
Prepared By RG Hollenbeck	**Department** Envir
Areas Visited 222S at 200 W	**Person(s) Contacted** Marty Martyn, Jay Warwick

Purpose of Trip

Certification of closure activities

Field Report Summary

The rear center and rear right sections of the containment basin in connex box #2 was cleaned. An oily residue was present in the bottom of the basin. The sand/dirt/dust/debris was scooped up and bagged. Part or all of the scouped up material was saved in a bottle for future analysis. The basin floor and walls were sprayed ~~wiped~~ with a degreaser and wiped with wipes. The basins were resurveyed ~~with~~ by an RPT and found to be clean. The wipes, scoup etc was tripple bagged and will be stored until

Pictures Taken

the waste is designated. RH 3-12-98

Follow-up Requested

Distribution

FIELD TRIP REPORT

Project No.	Project Title: 222 S Storage Structure Closure	
Date: 3/20/98	Time Departed FDNW: 7:15	Time Returned FDNW: 11:45
Prepared By: T. Ambalam	Department: Envir.	
Areas Visited: 222S at 200W.	Person(s) Contacted: Marty Martin, Jay Warwick	

Purpose of Trip

Certification of closure activities at the mixed waste storage area. Refer: Partial Closure Plan - 222S Dangerous and Mixed waste storage Structures.

Field Report Summary

Four SST containment basins were removed from the conex boxes (two). Visual inspection was made of the basin and conex boxes. LAW were obtained for basins, wood floors and boxes and no radiation was found as shown by the counters. Discoloration, stains due to waste contamination were not found. Dust and debris were removed from the boxes.

Tom Ambalam
3/20/98.

Pictures Taken

Follow-up Requested

Distribution

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 1

2. Component description (e.g., wall, wood floor): interior walls

3. Material (e.g., wood, metal): metal

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/5/98 time: 11:15

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable): ______

7. If photographs taken, attach

DECONTAMINATION, if required
date: ______ time: ______

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background): ______

9. Decontamination method used (or N/A): ______

10. Comments on decontamination (or N/A): ______

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: __________ time: __________

12. Radiation survey performance standard met? (at or below background): __________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): __________

14. Comments on verification inspection (or N/A): __________

15. If photographs taken, attach.

WITNESSES:

G.S. Warwick / Env. Compliance		3.15/98
Print: name and title	Signature	Date
MARTY L MARTIN / MGR HAZ MAT CNTRL		3-6-98
Print: name and title	Signature	Date
Print: name and title	Signature	Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 1

2. Component description (e.g., wall, wood floor): grate

3. Material (e.g., wood, metal): fiberglass

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/5/98 time: 11:15 am

4. Radiation survey performance standard met? (at or below background):
yes SAM SALIZAR

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable):
Full swipe survey on all grates, top & bottom

7. If photographs taken, attach

DECONTAMINATION, if required
date: ____________ time: ____________

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background):
____

9. Decontamination method used (or N/A): ____________

10. Comments on decontamination (or N/A): ____________

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: ____________ time: ____________

12. Radiation survey performance standard met? (at or below background): ____________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): ____________

14. Comments on verification inspection (or N/A): ____________

15. If photographs taken, attach.

WITNESSES:

G.J. WARWICK / ENV. Compliance		3/5/98
Print: name and title	Signature	Date
M.L. MARTIN / MGR HAZ MAT CNTRL		3-5-98
Print: name and title	Signature	Date
Print: name and title	Signature	Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 1

2. Component description (e.g., wall, wood floor): containment basin

3. Material (e.g., wood, metal): metal (stainless steel)

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/5/98 time: 1300

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable): No signs of potential contamination

7. If photographs taken, attach

DECONTAMINATION, if required
date: ____________ time: ____________

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background): ____________

9. Decontamination method used (or N/A): ____________

10. Comments on decontamination (or N/A): ____________

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: ____________ time: __________

12. Radiation survey performance standard met? (at or below background): _____________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): ______________________

14. Comments on verification inspection (or N/A): ______________________

15. If photographs taken, attach.

WITNESSES:

G J Warwick / Env. Compliance — 3/5/98
Print: name and title — Signature — Date

MARTY L MARTIN / MGR HAZ MAT CNTRL — 3-6-98
Print: name and title — Signature — Date

______________________ — ______________ / ______
Print: name and title — Signature — Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 1

2. Component description (e.g., wall, wood floor): floor

3. Material (e.g., wood, metal): wood

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3-20-98 time: 11:00 am

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable): ______
No stains or signs of spills noted

7. If photographs taken, attach

DECONTAMINATION, if required
date: ______ time: ______

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background): ______

9. Decontamination method used (or N/A): ______

10. Comments on decontamination (or N/A): ______

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: __________ time: __________

12. Radiation survey performance standard met? (at or below background): __________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): __________

14. Comments on verification inspection (or N/A): __________

15. If photographs taken, attach.

WITNESSES:

G J Warwick / Env. Compliance		3/20/98
Print: name and title	Signature	Date
ML MARTIN / MGR HAZ MAT. CNTROL		3-20-98
Print: name and title	Signature	Date
Print: name and title	Signature	Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 2

2. Component description (e.g., wall, wood floor): grate

3. Material (e.g., wood, metal): fiberglass

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/5/98 time: 13:00

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable): RCT performed full survey of grating

7. If photographs taken, attach

DECONTAMINATION, if required
date: ______ time: ______

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background):

9. Decontamination method used (or N/A):

10. Comments on decontamination (or N/A):

11. If photographs taken, attach

980303.1210

VERIFICATION INSPECTION, if required
date: ____________ time: ___________

12. Radiation survey performance standard met? (at or below background): ____________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): ____________________

14. Comments on verification inspection (or N/A): ____________________

15. If photographs taken, attach.

WITNESSES:

G J Warwick / Env. Compliance — [signature] — 3/15/98
Print: name and title — Signature — Date

MARTY L MARTIN / H&R HAZ MAT CONTROL — [signature] — 1-3-6-98
Print: name and title — Signature — Date

Print: name and title — Signature — Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 2

2. Component description (e.g., wall, wood floor): interior walls

3. Material (e.g., wood, metal): metal

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/5/98 time: 13:00

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable): RCT performed full (>90%) swipe of walls and ceiling

7. If photographs taken, attach

DECONTAMINATION, if required
date: ____ time: ____

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background): ____

9. Decontamination method used (or N/A): ____

10. Comments on decontamination (or N/A): ____

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: ______________ time: ____________

12. Radiation survey performance standard met? (at or below background): ______________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): ______________________________

14. Comments on verification inspection (or N/A): ______________________________

15. If photographs taken, attach.

WITNESSES:

G.S. Warwick / Env Compliance
Print: name and title

Signature 3/5/98
Date

MARTY L MARTIN / MGR, HAZ WASTE/ENV'TAL
Print: name and title

Signature 1-3-6-98
Date

Print: name and title

Signature
Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 2

2. Component description (e.g., wall, wood floor): containment basin

3. Material (e.g., wood, metal): metal (stainless steel)

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/5/98 time: 13:30

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): No

6. Comments on survey/inspection (or N/A if not applicable): Wetness found in Back sump. Work stopped until decon can be performed per closure plan. Further Review revealed that it is an oil or oil based material

7. If photographs taken, attach

DECONTAMINATION, if required
date: 3-12-98 time: 13:00

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background): yes boxes were moved previously

9. Decontamination method used (or N/A): Scraped up soil and misc solids into container, dry wiped basins and utilized "Natural Solutions" degreaser
Sample submitted WP # 2S-98-00351 W

10. Comments on decontamination (or N/A): Decontamination went well
No discrepancies

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: 3-12-98 time: 13:40

12. Radiation survey performance standard met? (at or below background): yes

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

14. Comments on verification inspection (or N/A): No signs of potential contamination

15. If photographs taken, attach.

WITNESSES:

GS Woodward / Env Compliance
Print: name and title

Signature Date 3/12/98

MARTY L MARTIN / MER HAZMAT CNTRL
Print: name and title

Signature Date 3/12/98

Print: name and title

Signature Date

INSPECTION CHECKLIST
FOR THE 222-S DANGEROUS AND MIXED WASTE STORAGE AREA
STORAGE STRUCTURES

1. Storage structure identification: TSDF 2

2. Component description (e.g., wall, wood floor): floor

3. Material (e.g., wood, metal): wood

NOTE: Attach photographs taken during visual inspection.

INITIAL INSPECTION
date: 3/20/98 time: 11:00 am

4. Radiation survey performance standard met? (at or below background): yes

5. Visual inspection performance standard met? (no obvious visual signs of potential contamination): yes

6. Comments on survey/inspection (or N/A if not applicable): ____________
no stains or signs of spills noted
____
____

7. If photographs taken, attach

DECONTAMINATION, if required
date: ____________ time: ____________

8. (If required to move the structures) Radiation survey performance standard at decontamination location met? (at or below background):
____

9. Decontamination method used (or N/A): ____________
____
____
____

10. Comments on decontamination (or N/A): ____________
____
____
____

11. If photographs taken, attach

VERIFICATION INSPECTION, if required
date: ____________ time: ____________

12. Radiation survey performance standard met? (at or below background): ____________

13. Visual inspection performance standard met? (no obvious visual signs of potential contamination): ____________

14. Comments on verification inspection (or N/A): ____________

15. If photographs taken, attach.

WITNESSES:

G.W. Warwick/Env. Compliance — 3/20/98
Print: name and title — Signature — Date

ML MARTIN/MGR HAZ MAT CONTROL — 3/20/98
Print: name and title — Signature — Date

Print: name and title — Signature — Date

Plan No: 1997-ASRCO-RSP-06 Page 1 of 3	Effective Date: 3/2/98
Title: SURVEY PLAN FOR RELEASE, REMOVAL AND REPLACEMENT OF THE 222-S DANGEROUS AND MIXED WASTE STORAGE STRUCTURES (CONEX BOXES).	Expiration Date: 3/31/98

1.0 PURPOSE/SCOPE:

1.1 Purpose: The purpose of this procedure is to provide guidance to the 222-S Radiological Control Technicians in the downposting, removal and replacement of the 222-S Dangerous and Mixed Waste Storage Conex boxes, # 1 and # 2.

1.2 Scope: The scope of this plan covers the surveys of the old Conex boxes, the baseline in new location, removal of Conexes and placement of new storage boxes.

1.3 Discussion: New Dangerous and Mixed Waste Storage boxes have been procured and need to replace the old conex boxes. Part of the process for this replacement is a survey of the old boxes to allow them to be downposted and removed. Additionally a baseline survey needs performed where they will be relocated to and a baseline after they are removed for the new boxes.

2.0 PREREQUISITES:

- Health Physics Technician (HPT) Core/Site Training
- Instruction in this Survey Release Plan

3.0 PRECAUTIONS/LIMITATIONS:

3.1 The old Conex Boxes will be emptied of all containers/material.

3.2 Radiological release will consist of:

- α and β-γ removable contamination surveys using Large Area Wipes (LAW's).
- Direct measurements. The direct measurements will be performed using 5 second contact measurements.

4.0 REQUIRED EQUIPMENT/MATERIALS:

- PAM, GM/P11
- CP

Author	Reviewer	Approval, RC Area Manager
J.L. Miller	C.E. Armstrong	P. I. Linn

Plan No: 1997-ASRCO-RSP-06	Page 2 of 3	Effective Date: 3/2/98
Title: SURVEY PLAN FOR RELEASE, REMOVAL AND REPLACEMENT OF THE 222-S DANGEROUS AND MIXED WASTE STORAGE STRUCTURES (CONEX BOXES).		Expiration Date: 3/31/98

- Radiological Survey Report Form (BD-6000-010)
- Smear Material, for both LAW and Technical Smears.

5.0 PROCEDURE

5.1 Survey of Old Conex Boxes

5.1.1 Perform random LAW smears of the accessible exterior surfaces of the Conex Boxes.

5.1.1 Perform a visual inspection of the interior of the Conex Boxes. During this visual inspection look for stained or discolored areas on the floor areas of the Conex Boxes. Note any of these areas for later surveys.

5.1.2 Perform random LAW smears of the walls in the Conex boxes and count these using portable survey instruments.

5.1.3 Perform random LAW smears of the fiberglass floor covering the secondary containment pan in the Conex Boxes. Count these using portable survey instruments.

5.1.4 Have fiberglass grating removed. Visually inspect the Secondary Containment Pan looking for stained or discolored areas.

5.1.5 Perform random LAW smears of the Stainless Steel Secondary Containment Pan. Count these using portable survey instruments.

5.1.6 Have Secondary Containment Pan removed. Visually inspect wooden flooring looking for stained or discolored areas.

5.1.7 Perform random LAW and direct surveys of the wood flooring.

5.1.8 If any areas were noted to be stained or discolored, indicating spills, perform technical smears of these areas.

NOTE: Any technical smears taken shall be counted on mini-scalers.

5.1.9 Perform random direct surveys of the walls and floors of the Conex Boxes.

5.1.10 For any stained or discolored areas on the floor, perform thorough direct survey including 5 second static counts.

5.1.11 Complete a Radiological Survey Report documenting all the information from the survey of the Conex Boxes.

Plan No: 1997-ASRCO-RSP-06	Page 3 of 3	Effective Date: 3/2/98
Title: SURVEY PLAN FOR RELEASE, REMOVAL AND REPLACEMENT OF THE 222-S DANGEROUS AND MIXED WASTE STORAGE STRUCTURES (CONEX BOXES).		Expiration Date: 3/31/98

5.2 DOSE RATE BASELINE AT STORAGE LOCATION FOR OLD BOXES

5.2.1 Perform a dose rate survey in the area planned as the location for the old Conex Boxes.

5.2.2 Complete a Radiological Survey Report documenting the dose rates in the area.

5.3 BASELINE FOR NEW STORAGE BOXES

5.3.1 After old Conex Boxes have been moved and the area prepared for new boxes, perform a dose rate survey of the area vacated by the old Conex Boxes.

5.3.2 Complete a Radiological Survey Report documenting the dose rates in the area.

6.0 REFERENCES

Hanford Site Radiological Control Manual, HSRCM-1

Partial Closure Plan for the 222-S Dangerous and Mixed Waste Storage Area Storage Structures

Project Hanford Management Contract
RADIOLOGICAL SURVEY REPORT

Survey No. 244150

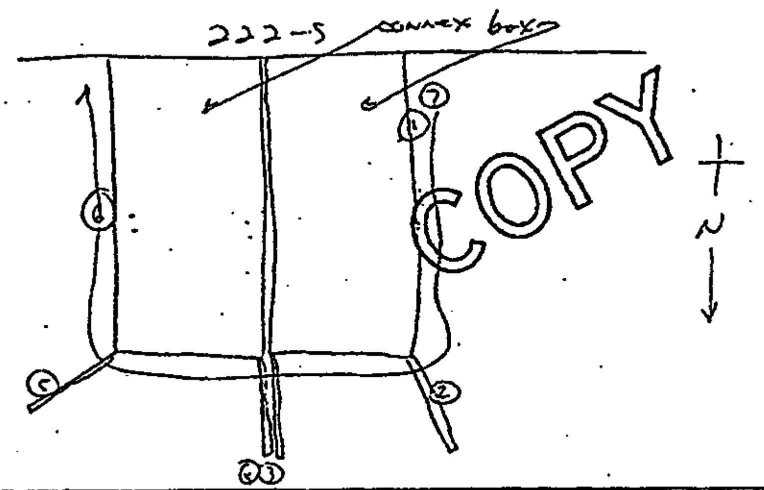
Date: 3-3-98 | Time: Start / Stop 1300 / 1430 | RWP No.(s) S-401 / 403 | Page 1 of 2

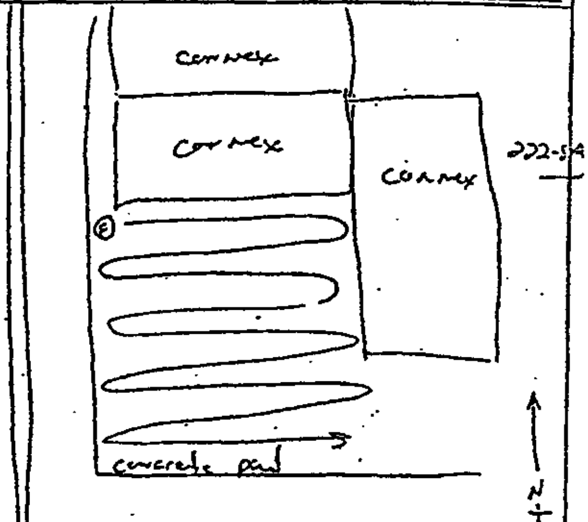
Area/Bldg./Room/Location (Code): 200W / 222-S / ram storage connex's / north side of Building | F.C. S

Job Description: Survey of connex boxes per a release survey plan, accomplished prior to planned movement on 3-4-98

Purpose of Survey (check appropriate box(es)):
Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill
Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ APM (PSD)
☐ HRA/VHRA Work ☐ Job Coverage ☒ Other
☐ Exposure Incident ☐ Material Release
☐ RM Transfer/Shipment ☐ Required, Task No.

Map/Sketch





No.	Description	Dist.	DOSE RATES: Shallow mrem/h	γ (pen) mR/h	η mrem/h	CONTAMINATION LEVELS: Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
1	West side of connex							<1000	<20	N/A
2	outside of door							<1000	<20	
3	" " "							<1000	<20	
4	" " "							<1000	<20	
5	" " "							<1000	<20	
6	East side of connex							<1000	<20	
7	dose rate of connex	C	<0.5	<0.5						
8	dose rate of cement pad	F	<0.5	<0.5						
			N/A							

Continued on page 2

Air Sample Results (μCi/ml)

	BZ	GA	Initial	Decay
α 1			N/A	
β 1				
α 2				
β 2				

Legend
(#) - Smear Location
△ - Air Sample Location
[#] - Large Area Smear
* - Contact Reading
Other N/A

BD-6000-010 (02/97)

Project Hanford Management Contract RADIOLOGICAL SURVEY REPORT	F.C. S	Page 2 of 2	Survey No. 244150

No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	η mrem/h	CONTAMINATION LEVELS Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
				N/A						

Comments

N/A

Samples Counted with portable instruments for ≥0.1 minutes.

Instr./Probe Model	RO-3B (CP)	(g-m/probe)	PAM			
Serial No.	3-0017	3-0255 / 9-0390	2-0484		N/A	
Efficiency	—	14%	10%			
Correction Factor	3 / 1.5	7	10			

ADDITIONAL REPORTS

RPR No. N/A Sample Counter Log(s) N/A
RSR No. N/A ... Contamination - Skin N/A Procedure: As directed
... Contamination - Clothing N/A Other(s) N/A

RCT:	Reviewer:
Date: 3-3-98 Payroll No.: 82821	Date: 3/4/98 Payroll No.: 80290
Name (Print): Miller, Rick	Name (Print): John L Miller
Signature: [signature]	Signature: [signature]

BD-6000-010R (02/97)

COPY

Project Hanford Management Contract
RADIOLOGICAL SURVEY REPORT

Survey No. 244163

Date	Time: Start / Stop	RWP No.(s)	Page 1 of 2
03/04/98	1300/1500	N/A	

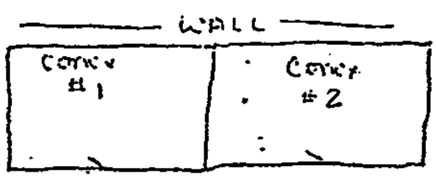
Area/Bldg./Room/Location (Code): 200 West 222-S Conex Box PAD

F.C.: S

Job Description: Moving Conex Boxes to a new Location. Conex boxes #1 & #2. Surveyed Side of #2 then it was lifted & bottom & back were Done. Surveyed the other

Purpose of Survey (check appropriate box[es]):
Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill
Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ APM (PSD)
☐ HRA/VHRA Work ☒ Job Coverage ☐ Other
☐ Exposure Incident ☐ Material Release
☐ RM Transfer/Shipment ☐ Required, Task No. ____

Map/Sketch



No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	mrem/h	CONTAMINATION LEVELS Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
1	LAW Conex #2 bottom & Sides	C	<.5	<.5	NA	NA	NA	<D	<D	NA
2	Conex #2 back	C	<.5	<.5				<D	<D	
3	Conex #1 back Sides bottom	C	<.5	<.5				<D	<D	
NA	NA	NA	NA	NA				NA	NA	

Continued on page 2

Air Sample Results (μCi/ml)

	BZ	GA	Initial	Decay
α 1	N	A		NA
β 1				
α 2				
β 2	N	A		NA

Legend
Ⓢ - Smear Location
△ - Air Sample Location
▢ - Large Area Smear
* - Contact Reading
Other ____

BD-6000-010 (02/97)

Project Hanford Management Contract
RADIOLOGICAL SURVEY REPORT

F.C. S | Page 2 of 2 | Survey No. 244163

No.	Description	Dist.	DOSE RATES: Shallow mrem/h	γ (pen) mR/h	β mrem/h	CONTAMINATION LEVELS: Total (/100 cm^2) β (dpm)	α (dpm)	Removable (/100cm^2) β (dpm)	α (dpm)	mrad/h
			N			A				

COPY

Comments

side when box was pulled away. Surveyed side of box #1 also. After box #2 was pulled away. Surveyed concrete job was halted due to mouse poop. It was cleaned up quickly & box #1 was surveyed & removed with no [illegible]. Found no levels above background LAWs. All smears were LAWs (Large Area Wipes) because that is what the survey plan called for. βγ = R- 2in/sec. 1/4" from LAW 80% of boxes surveyed. α .4 in/sec 1/4" from LAW 80% of boxes surveyed.

Samples Counted with portable instruments for .1 minutes.

Instr./Probe Model	RO-3B (CP)	(g-m/probe)	PAM				
Serial No.	3-0001 3-0031	3-0189/C-0313	2-0334				
Efficiency	1	.10	.14		N	A	
Correction Factor	1	10	7				

ADDITIONAL REPORTS

RPR No. NA | Sample Counter Log(s) NA
RSR No. ↓ | ... Contamination - Skin ↓ | Procedure: 1997-ASECU-RSP-06
... Contamination - Clothing NA | Other(s) ↓

RCT:	Reviewer:
Date: 3/4/98 Payroll No.: 83044	Date: 3/6/98 Payroll No.: 80290
Name (Print): LA SPICER	Name (Print): John L Miller
Signature: [signature]	Signature: [signature]

BD-6000-010R (02/97)

Project Hanford Management Contract
RADIOLOGICAL SURVEY REPORT

Survey No. 244174

Date	Time: Start / Stop	RWP No.(s)	Page 1 of 2
3/5/98	1100 11500	N/A	

Area/Bldg./Room/Location (Code): 200 WEST 222 S BLDG. EAST OF FACILITY

F.C.: 5

Job Description: SURVEY INSIDE OF CONEX BOX #1, #2
N/A

Purpose of Survey (check appropriate box(es)):
Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill
Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ APM (PSD)
☐ HRA/VHRA Work ☐ Job Coverage ☐ Other
☐ Exposure Incident ☒ Material Release
☐ RM Transfer/Shipment ☐ Required, Task No.

Map/Sketch

N/A N/A

COPY

N/A N/A

No.	Description	Dist.	DOSE RATES: Shallow mrem/h	γ (pen) mR/h	η mrem/h	CONTAMINATION LEVELS: Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
1	CONEX BOX #1	N/A	N/A	N/A	N/A	<5000	<500	LAW <1000	LAW <100	N/A
2	FIBERGLASS CRATE BOX #1					<5000	<500	LAW <1000	LAW <100	
3	CONEX BOX #2					<5000	<500	LAW <1000	LAW <100	
4	FIBERGLASS CRATE BOX #2					<5000	<500	LAW <1000	LAW <100	
5	FLOOR OF BACK RIGHT CORNER BOX #2					<5000	<500	<1000	<20	
N/A	N/A					N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Continued on page 2

Air Sample Results (μCi/ml) — N/A

	BZ	GA	Initial	Decay
α 1				
β 1				
α 2				
β 2				

Legend
(#) - Smear Location
△ - Air Sample Location
[#] - Large Area Smear
* - Contact Reading
Other N/A

BD-6000-010 (02/97)

Project Hanford Management Contract RADIOLOGICAL SURVEY REPORT	F.C. 5	Page 2 of 2	Survey No. 244174

No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	η mrem/h	CONTAMINATION LEVELS Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
N/A										N/A

COPY

Comments

NO RADIOLOGICAL PROBLEMS OBSERVED WHILE PERFORMING SURVEYS OF CONEX BOXES. OIL SUBSTANCE FOUND ON FLOOR OF CONEX BOX #2. NO CONTAMINATION FOUND.
NIM SERIAL 4-0010 / C-0008 α EFF .36, CF: 2.78
β EFF: .47, CF = 2.13.
COUNTER LOG # S03051998.101 A
N/A

Samples Counted with portable instruments for 1 minutes.

Instr./Probe Model	RO-3B (CP)	(g-m/probe)	PAM	N/A			
Serial No.	3-0031	80149 / C0198	Z-0334				
Efficiency	1	.1	.14				
Correction Factor	1	10	7	N/A			

ADDITIONAL REPORTS

RPR No. N/A Sample Counter Log(s) N/A

RSR No. N/A ... Contamination - Skin N/A Procedure: ONI IN-717 5.7

... Contamination - Clothing N/A Other(s) N/A

RCT:	Reviewer:
Date: 3/5/98 Payroll No.: 68647	Date: 3/6/98 Payroll No.: 80240
Name (Print): SAMUEL C O SALAZAR	Name (Print): John L Miller
Signature: Samuel Salazar	Signature: J L Miller

BD-6000-010B (02/97)

Project Hanford Management Contract
RADIOLOGICAL SURVEY REPORT

Survey No. 244233

Date	Time: Start / Stop	RWP No.(s)	Page
3-12-98	13:20 / 1400	STRM N/A	1 of 2

Area/Bldg./Room/Location (Code): 200 W, 222-S Conex Box
F.C. 2

Job Description: Survey Conex Box after Decontamination efforts were performed in Conex Box. No problems incurred.

Purpose of Survey (check appropriate box(es)):
Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill
Alarm Response: ☐ CAM, ☐ ~~ARM~~(RAM), ☐ APM (PSD)
☐ HRA/VHRA Work ☑ Job Coverage ☐ Other
☐ Exposure Incident ☐ Material Release
☐ RM Transfer/Shipment ☐ Required, Task No. ______

Map/Sketch

N/A

COPY

No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	n mrem/h	CONTAMINATION LEVELS Total (/100 cm2) β (dpm)	α (dpm)	Removable (/100cm2) β (dpm)	α (dpm)	mrad/h
1	Floor of Conex Box	C	<0.5	<0.5	N/A	<5K	<100	<1000	<20	N/A
2	Oil Residue in Conex	C	<0.5	<0.5	N/A	<5K	<100	<1000	<20	N/A
N/A										N/A

Continued on page 2

Air Sample Results (μCi/ml)

	BZ/GA	Initial	Decay
α 1	N/A		N/A
β 1			
α 2			
β 2	N/A		N/A

Legend
(#) - Smear Location
△ - Air Sample Location
[#] - Large Area Smear
* - Contact Reading
Other ______

RD-6000-010 (02/97)

Project Hanford Management Contract RADIOLOGICAL SURVEY REPORT	F.C. S	Page 2 of 2	Survey No. 244233

No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	n mrem/h	CONTAMINATION LEVELS Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
N/A										N/A
N/A										N/A

COPY

Comments
Technician collected oil residue IN Sample Container for analysis in lab. No radionuclides detected with portable instrumentation while performing static checks. Tech smears were less than LARGE AREA WIPES AND TECH SMEARS WERE TAKEN AND Photographed by Environmental N/A
N/A
N/A N/A

Samples Counted with portable instruments for 1 minutes.

Instr./Probe Model	RO-3B (CP)	(g-m/probe)	PAM	Mini Scaler	N/A		H/A
Serial No.	3-0075	B-0153 / A-0381	2-0293	4-0012 / A-0010			
Efficiency	100	.10	.14	.36 α .47 ββ			
Correction Factor	1	10	7	2.13 ββ / 2.78 α	N/A		N/A

ADDITIONAL REPORTS

RPR No. N/A Sample Counter Log(s) N/
RSR No. N/A ... Contamination - Skin N/A Procedure: N/A
... Contamination - Clothing N/A Other(s) N/A

RCT:	Reviewer:
Date: 3-12-98 Payroll No.: 61217	Date: 3/13/98 Payroll No.: 50290
Name (Print): J R. MORALES	Name (Print): John L Miller
Signature: JR Morales	Signature: John L Miller

BD-6000-010R (02/97)

Project Hanford Management Contract
RADIOLOGICAL SURVEY REPORT

Survey No. 244307

Date	Time: Start / Stop	RWP No.(s)	Page 1 of 2
3-20-98	0830 / 10:45	N/A	

Area/Bldg./Room/Location (Code): 200W, 222-S Conex Box 1+2 at SA
F.C.: 5

Job Description: Survey of Conex Box 1 & 2 for release after sumps removed. Both Conex Boxes were downposted. — No Problems incurred.

Purpose of Survey (check appropriate box(es)):
Contamination Incident: ☐ Skin, ☐ Clothing, ☐ Spill
Alarm Response: ☐ CAM, ☐ ARM(RAM), ☐ APM (PSD)
☐ HRA/VHRA Work ☐ Job Coverage ☐ Other
☐ Exposure Incident ☐ Material Release
☐ RM Transfer/Shipment ☐ Required, Task No. N/A

Map/Sketch

N/A

COPY

N/A

N/A

N/A

No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	mrem/h	CONTAMINATION LEVELS LAW Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
1	Conex Box #1 Floor	N/A	N/A	N/A	N/A	<5K	<100	<1000 LAW	<20 LAW	N/A
2	Conex Box #2 Floor	N/A	N/A	N/A	N/A	<5K	<100	<1000 LAW	<20 LAW	N/A
3	Conex Box #1 Tech	N/A	N/A	N/A	N/A	N/A	N/A			N/A
4	Conex Box 1A Tech	N/A	N/A	N/A	N/A	N/A	N/A			N/A
5	Conex Box 2 Tech	N/A	N/A	N/A	N/A	N/A	N/A			N/A
6	Conex Box #1 Underside	N/A	N/A	N/A	N/A	N/A	N/A	<1000	<20	N/A
7	Conex Box #2 Underside	N/A	N/A	N/A	N/A	N/A	N/A	<1000	<20	N/A

Continued on page 2

Air Sample Results (μCi/ml)

	BZ	GA	Initial	Decay
α 1	N/A			N/A
β 1				
α 2				
β 2	N/A			N/A

Legend
Ⓢ - Smear Location
△ - Air Sample Location
F - Large Area Smear
* - Contact Reading
Other ______

BD-5000-010 (02/97)

Project Hanford Management Contract RADIOLOGICAL SURVEY REPORT	F.C. 5	Page 2 of 2	Survey No. 244307

No.	Description	Dist.	DOSE RATES Shallow mrem/h	γ (pen) mR/h	n mrem/h	CONTAMINATION LEVELS Total (/100 cm²) β (dpm)	α (dpm)	Removable (/100cm²) β (dpm)	α (dpm)	mrad/h
N/A										N/A

Comments

N/A N/A

COPY

Samples Counted with portable instruments for , 2 minutes.

Instr./Probe Model	RO-3B (CP)	(g-m/probe)	PAM	N/A			N/A
Serial No.	N/A	5-0082 9-0295	2-0097				
Efficiency	N/A	.10	.14				
Correction Factor	N/A	10	7	N/A			N/A

ADDITIONAL REPORTS

RPR No. N/A Sample Counter Log(s) N/A

RSR No. N/A ... Contamination - Skin N/A Procedure: N/A

... Contamination - Clothing N/A Other(s) Good Practices

RCT:	Reviewer:
Date: 3-20-98 Payroll No.: 6C217 84731	Date: 3/23/98 Payroll No.: 80210
Name (Print): J R MORALES G M GONUSKEY	Name (Print): John L Miller
Signature: [signature] [signature]	Signature: [signature]

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